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A COMBINED DARK FIELD OUTFIT IN SYPHILIS
McNABB, MATTHEWS and McCLURE

RULES FOR CHOICE OF CAUSES OF DEATH
E. S. MACPHAIL

SWIMMING POOL CONSTRUCTION
E. H. DARLING

**THE DIAGNOSTIC CLINIC IN PATHOLOGY
IN THE CONTROL OF CANCER**
J. E. BATES

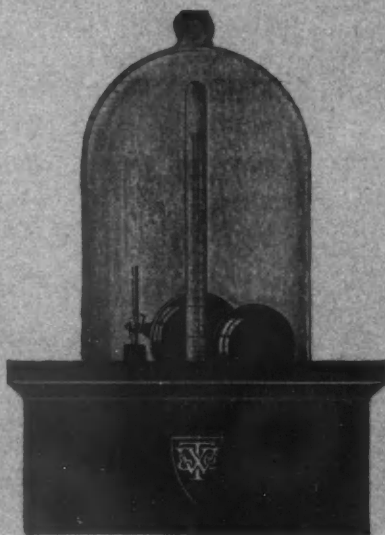
TUBERCULOSIS STATISTICS IN CANADA
E. E. WODEHOUSE

BACTERIOPHAGE IN INTESTINAL INFECTION
JOHNSTON, EBBE and KAAKE

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A Combined Dark Field Outfit in the Early Diagnosis of Syphilis*

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THE differential diagnosis of the primary lesion of syphilis is dependent upon three procedures, namely, (a) repeated dark field examinations of the serum from the lesion, (b) the local Wassermann or Kline reactions performed upon the serum obtained from the lesion, and (c) repeated serological tests carried out on peripheral blood specimens. Universally, the dark field examination has proved the most efficient diagnostic method for primary syphilis. In a study of 231 cases of early syphilis, Stokes (1) and McFarland found its highest efficiency during the first two weeks of the primary lesion. In a co-operative clinical study (2) in the treatment of syphilis, clinics of the Johns Hopkins, Michigan, Pennsylvania, and Western Reserve Universities, and the Mayo clinic, assisted by the Venereal Disease Division of the United States Public Health Service, found that the usefulness of the dark field is not limited to the sero-negative primary lesion. They also state that an effort should be made to find the organism even after the fully developed reaction to the infection has taken place. Table I shows the results obtained with the dark field examination in this co-operative study.

TABLE I

Results of Dark Field Examinations For Patients Admitted With Each Stage of Early Syphilis.

Stage of early syphilis on admission	Total	Dark Field Examinations			
		Positive		Negative	
		No.	Per cent	No.	Per cent
Sero-negative primary	162	153	94.4	9	5.6
Sero-positive primary	179	130	72.6	49	27.4
Early secondary	226	179	79.2	47	20.2
Late secondary	11	8	72.7	3	27.3
Total	578	470	81.3	108	18.7

It can be seen that the dark field examination yielded 94.4 per cent positives in the early sero-negative and 72.6 per cent positive in the sero-positive

*Presented before the Laboratory Section at the Twenty-Second Annual Meeting of the Canadian Public Health Association, Saint John, N.B., June, 1933.

primary stage. This report also states that excellent results were obtained by the employment of the dark field in both the late primary and the secondary stages.

Early in December, 1932, we decided to determine whether a dark field examination carried out on chancre fluid forwarded from clinics by mail would prove reliable. We considered it desirable to obtain a peripheral blood specimen taken at the same time as the chancre serum specimen, thus affording an opportunity of obtaining accurate data concerning the sensitivity and specificity of various flocculation tests, including the presumptive Kahn, Kline slide, and Hinton test. A combined dark field outfit was prepared and a number of these placed in four venereal disease clinics, with instructions as to their use. These clinics were from 150 to 1,000 miles distant from our central laboratory.



The Combined Dark Field Outfit

Description of the Outfit

The outfit consists of a small glass tube, "A", containing three capillary tubes intended for withdrawing and holding the chancre serum. After the chancre fluid enters these tubes by capillary attraction, they are sealed by pressing each end into a mixture of fifty per cent bees-wax and vaseline contained in vial "B". A wooden block, "C", holds two glass slides on which smears can be made, thus permitting a study of the efficiency of smear preparations as compared with dark field preparations of aged chancre serum. The peripheral blood specimen is submitted in the glass tube, "D". The data and instruction sheet, "F", is wrapped around this tube. After collection the

specimens are placed in the metal container, "G". This inner metal container is then placed in the outer cardboard mailing case, "E".

Routine Diagnostic Examination

In the examination of these specimens, the dark field is carried out first, after which the smear preparations are studied. The Fontana stain, as described in the Medical Research Council's Special Report Series No. 19 (3), is used in staining the smear preparations. In examining the peripheral blood when sufficient sample is received, five serological tests are used. Unfortunately these outfits did not contain sufficient chancre serum to permit local Wassermann and Kline tests.

Description of Serological Tests

As some of these tests have been recently introduced, a brief outline of each is given.

Kolmer Wassermann.—This test is conducted according to the author's instructions (4) (5). The antigen is a cholesterolized acetone insoluble extract of beef heart. The tests are set up each afternoon. Patient's sera, antigen and complement are added. The tests are then placed in the ice-box over night. The following morning they are removed and incubated in the water-bath at 38°C. for 10 to 15 minutes. The hemolysin is then added, and finally a 2 per cent solution of sheep red corpuscles. The tests are then incubated in the water-bath for one hour at 38°C.

Kahn Antigens.—For the Kahn test (6) (7) there are two antigens: the standard antigen, which is an alcoholic extract of powdered beef heart, to which cholesterol, 6 mgms. per cc. of extract, is added prior to using; and the sensitized antigen or presumptive antigen, which is standard antigen to which a greater concentration of lipoids and additional cholesterol have been added. Once prepared, standard antigen is placed in amber coloured, glass stoppered bottles, and has been found to remain biologically identical in sensitivity and specificity for six years. Standard antigen has not been found to be affected when placed in saline within a pH. range of 4 to 11. Sensitized presumptive antigen, on the other hand, is more sensitive to heat and light. If placed in direct sunlight, the change is indicated by an increase in titre and in sensitivity. With ordinary care, however, this suspension remains uniform for long periods of time.

Kahn Tests.—Like other flocculation tests, the Kahn offers the advantage of only three reagents being utilized in the actual tests, namely, antigen, saline and patient's serum. It is, therefore, essential that every detail be strictly adhered to in the preparation of the antigen. In making a study of the nature of the ultra-microscopic reaction between the Kahn antigen and syphilitic and non-syphilitic serum, Kahn found that they had a similar appearance under the ultra-microscope. Both syphilitic and non-syphilitic sera possess the property of precipitation, when mixed with antigen suspensions. Syphilitic

serum possesses this property to a more marked degree. Shaking the antigen and incubation markedly aid precipitation.

Kline Slide Tests.—The Kline test (8) is carried out in a chamber made by a ring of paraffin on a glass slide. The antigen used is a highly purified one containing alcohol soluble, acetone insoluble, and portions of beef heart. Various antigen suspensions are made from this original antigen, according to the test to be carried out. All suspensions contain a relatively large amount of cholesterin. Kline has proposed two tests, one a diagnostic test, the other the exclusion test. Both of these tests are carried out on heated and unheated blood serum, and on cerebro-spinal fluid. In cases where it is possible to obtain only a few drops of blood, he also suggests carrying out the tests on defibrinated finger blood. The test may also be carried out on chancre fluid as an aid in early diagnosis. In carrying out the test, antigen and serum or cerebro-spinal fluid are mixed in the proportions as directed. The slide is then shaken for a few minutes. The results are read immediately under the low power of the microscope. Definite precipitation indicates a positive result.

Hinton Test.—Hinton (9) (10), of the department of clinical research of the Boston Dispensary, has recently proposed a third modification. The test, a one-tube test, is readily carried out. The extract used is a cholesterinized beef heart extract. To 100 cc. of extract, 0.4 mgs. of cholesterin are added. To this extract proper proportions of a 5 per cent salt solution and a 50 per cent glycerol solution are added and thoroughly mixed. In carrying out the actual test, the blood serum should be freshly removed from the clot and inactivated at 55°C., as 56°C. inactivation, which is usually used, lessens the reaction. Equal parts of serum and antigen are mixed and shaken. The test requires incubation at 37°C. in the water-bath for 16 hours, or 24 hours' hot air incubation. When there is immediate need of a report, Hinton proposes a rapid method. In carrying out this method, the routine procedure is followed up to the point of incubation. The test is then centrifuged for 10 minutes at 2,000 per minute, and read. Plainly visible clearing and a marked precipitate denotes a positive reaction. On the other hand, a finely granular precipitate visible on shaking should be regarded as only a probable positive. All tubes which show a finely granular precipitate or no precipitate by this method should be shaken and incubated, read and reported, in a manner identical to the regular routine test. This test is of interest because of its simplicity. The author claims it to be sensitive, positive reactions having been obtained in the blood three, four and five days from the appearance of a primary sore. Hinton states that in a study of 161 cases of known syphilis of three years' or less duration, in which, during treatment, 929 Hinton tests in all were carried out, 24, or 6 per cent false negative reactions occurred. In a study of the same group, three or more consecutive negative reactions have shown neither clinical nor serological signs of relapse.

Findings on 77 Specimens Received in This Outfit

Table II shows the number of specimens examined, and the number and percentage of positive and negative reactions.

TABLE II

	No. Examined	Positive		Negative	
		No.	Per cent	No.	Per cent
Dark Field	77	56	72.7	21	27.3
Smears	49	29	59.2	20	40.8
P. Kahn	73	47	64.4	26	35.6
Hinton	62	40	64.5	22	35.5
S. Kahn	71	41	57.7	30	42.3
Wassermann	43	21	48.8	22	51.2
Kline (Diagnostic)	29	18	62.1	11	37.9

In examining this table, it can be seen that the dark field examination yielded 72.7 per cent, the highest percentage of positives. This figure would have been much higher had a number of specimens not been submitted from non-venereal sores. It can also be seen that, of the serological tests used, the presumptive Kahn and the Hinton proved to be the most sensitive methods. Unfortunately there was not sufficient blood serum to permit carrying out all tests on each specimen. The percentages obtained are a fair index of the relative sensitivity of the various serological tests used. A study of chancre sera using the Kline and Wassermann tests is being made.

The data sheets which accompanied each of these combined dark field outfits stated the date of exposure and the date of the appearance of the sore, as well as the number of days the primary lesion appeared prior to the patient's reporting and the taking of the specimen. The average number of days from the date of the appearance of the sore until 55 of these patients, on whom information was received, presented themselves for diagnosis and treatment was 14 days. In two of the cases the duration of the sore was 90 days. These two cases increased the average duration from 11 to 14 days.

Comparison of Methods

From the following summary it will be seen that no one method yielded perfect results. By the use of a combined outfit the laboratory can render a more efficient service to the clinician.

Number positive by dark field examination but with negative serological tests	6
Number positive by all tests	21
Number positive by dark field examination, with positive presumptive Kahn but with all other tests negative	1
Number positive by dark field examination, with smears negative	10
Number negative by dark field examination, with smears positive	1
Number negative by dark field examination, with positive serological tests	2

Discussion of Results

From the foregoing tables it can be seen that the dark field is the method of choice. The length of time which elapses between taking the specimen and the examination does not, in our opinion, reduce the efficiency of this examination. Chancre sera containing *Treponemata pallida* have been received from a point 1,000 miles distant from our laboratory. On examination the *Treponemata*

have been found still to possess their power of motility. Positive dark field preparations have been obtained from chancre serum specimens after storage in the ice-box for eight weeks and at room temperature for two weeks. Capillary tubes containing positive chancre serum specimens have been stored in the ice-box and again re-examined at weekly intervals. Positive dark field preparations have been obtained from these specimens after storage in



Micro-photograph showing *Treponema pallidum* after exposure to ice box.
(Temperature approximately 40°F. for eight weeks.)

the ice-box ten weeks. Dark field smear preparations well sealed with a mixture of vaseline and bees-wax have been found satisfactory for demonstration of *Treponemata* after having been left two weeks at ordinary room temperature in our laboratory.

In April last, six combined dark field outfits were sent to Col. L. W. Harrison (11), St. Thomas Hospital, London, England. Col. Harrison arranged to have chancre serum material placed into each outfit. The dates on which this material was collected were May 1st, May 2nd, May 5th, May 17th, May 26th and May 29th. The six outfits were posted in London on May 30th, arriving at our laboratory June 8th. Dark field preparations were made from a capillary tube in each outfit. Typical *Treponemata pallida* were found present in each smear. Organisms still possessed power of motility. When stained, smear preparations which accompanied each outfit contained organisms having the typical morphology of *Treponemata pallida*. Kline tests carried out on two of the chancre serum specimens yielded a positive result. On June 21st the remaining portions of the chancre fluid from three of these specimens were mailed to Col. Harrison, together with a specimen from an

Ontario case received at our laboratory on the above date. A letter from Col. Harrison dated July 6th records the receipt and the examination of these specimens, all of which he reports as showing motile *Treponemata pallida*. These specimens, as set up for dark field examination and sealed on the microscopic slides with wax, were returned by Col. Harrison and were received on July 17th. When examined on July 21st, motile *Treponemata pallida* were again found to be present. The specimens were then returned to Col. Harrison. A letter received on August 5th states that *Treponemata* are still present and motile. The intervals between the taking of the specimens and the last examination recorded by Col. Harrison were as follows: 80 days, 71 days, 68 days, and 46 days. Three of these specimens have crossed the ocean four times, being in all approximately 38 days in the mail. Two of the crossings were made in the original capillary tube outfit. The last two crossings were made on glass-slide cover-slip preparations sealed with wax. The fourth specimen has made three crossings, the first in a capillary tube, the second and third on a glass slide sealed with wax as previously described.

Chargin, Eller and Rein (12) made a study of 110 patients with sores suspected of being chancres, dark field local Kline tests on the chancre fluid, Kline blood serum test, Kahn and Wassermann tests being carried out. They found the local Kline test less sensitive than the Kline blood serum test.

Summary

A combined dark fluid outfit has been described. Seventy-seven outfits containing sore fluid and peripheral blood from seventy-seven patients having sores suspected of being chancres have been received. The dark field was positive in 56 or 72.7 per cent, while of 49 smears examined 29 or 59.2 per cent were positive. In one instance *Treponemata pallida* was found present where the dark fluid was negative. In examination of the peripheral blood from these patients, the presumptive Kahn was carried out on 73 cases and was positive in 47, or 64.4 per cent of the specimens examined.

Conclusions

In this preliminary study, the dark field examination has been found to be the most efficient method for the early diagnosis of syphilis. Of the serological tests used, the presumptive Kahn and the Hinton have been found to be the most sensitive tests.

From our preliminary study we believe that the combined dark field outfit will prove a very efficient laboratory procedure for the early diagnosis of syphilis.

Acknowledgments

We wish to thank Col. L. W. Harrison for sending the six specimens to us, and for his hearty co-operation in this experiment. We also wish to thank Dr. A. L. MacKay, Director of Preventable Diseases, for making the

arrangements with clinics in connection with the collection of these specimens, and Dr. Mothersill of the Ottawa Clinic for his hearty co-operation and interest. We also wish to thank Dr. W. J. Bell, Deputy Minister of Health, for the keen interest he has shown in this work.

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Announcement

Midwinter Meeting—Laboratory Section

PLANS are being completed for the holding of the second midwinter meeting of the Laboratory Section. So successful was the first meeting held in December last that the decision was made by the Section to hold, if possible, an annual midwinter meeting. According to arrangements, the Section will meet in the Royal York Hotel, Toronto, during the Christmas vacation. Announcement of the exact date and details of the programme will appear in the October issue of THE JOURNAL.

Titles of papers for presentation should be sent at the earliest date to Dr. M. H. Brown, secretary of the Section, 105 Bond Street, Toronto 2.

Rules for Choice of Causes of Death*

IN THE DOMINION BUREAU OF STATISTICS

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TO insure real comparability between the statistics of causes of death of various cities, provinces or countries, or between the statistics of the same city, province or country at various times, it is not sufficient that the system of nomenclature of diseases should be the same or capable of being put on the same basis. It is also important that where more than one pathological condition or other cause of death is mentioned on the medical certificate, the choice of a cause for statistical tabulation should be made in a similar manner in the geographical units to be compared or at the various periods for which it is desired to make comparisons of mortality in the same geographical unit.

So far as international comparisons are concerned, this ideal is far from realization, and the common use of the international list of causes of death by so many countries, either in its detailed, abridged or intermediate form, marks only one step, though an important one, towards the attainment of perfect uniformity in classification.

So far as individual countries are concerned, where central tabulation of the statistics of causes of death is carried out for the whole country, this uniformity at any particular time is assured, and a statistical office has every opportunity of preserving consistent rules for this choice of cause over a period of time; or whenever it is thought necessary to effect a change in the system followed, at least careful record can be kept of the modifications made, and their effect on the statistics of causes of death can be estimated.

In Canada, since the inception of the National System of Vital Statistics, with the first detailed report for the year 1921, central compilation has assured comparability between the statistics of the various provinces and local units, and the effort has been made to maintain consistent rules of choice of cause throughout.

The Introduction to the Manual of Causes of Death which we have recently issued, based on the Revision of the International List in 1929, contains the following paragraphs (page xviii):

"The choice of causes for statistical purposes is made in the Dominion Bureau of Statistics according to certain rules, which are, of course, often modified by information contained on the certificate, e.g., by the relative duration of the causes. These rules come mainly from four sources, as follows:

"(a) The rules issued by the International Commission in 1903.

"(b) The rules in use in the General Register Office, England, as contained in the Manual issued by that office in 1912.

"(c) The choice of causes as shown in the 'Manual of Joint Causes of Death' issued by the Bureau of the Census, Washington, D.C., in 1925.

"(d) Special rulings made in the Dominion Bureau of Statistics after consultation with the Department of National Health, Ottawa.

"The rules of the English Office have been largely followed, and Canadian practice in choice of causes would probably be found to conform more closely to the English rules than to those of any other country. The 'Manual of Joint Causes of Death' of the United States has been mainly used to supplement the English rules, in cases where the latter did not seem to apply."

The first source mentioned in this quotation is the rules issued by the

*Presented before the Section of Vital Statistics at the Twenty-Second Annual Meeting of the Canadian Public Health Association, Saint John, N.B., June, 1933.

International Commission in 1903. Since the establishment of the International List of Causes of Death, four Commissions have met at Paris for its revision, in the years 1901, 1909, 1920 and 1929. Of these Commissions only the first laid down a set of rules for the choice of causes of death. Later Commissions had this question under discussion, but did not formulate new rules or amend the original ones. These rules are as follows:

- "1. If one of the two diseases is an immediate and frequent complication of the other, the death should be classified under the head of the primary disease."
- "2. If the preceding rule is not applicable, the following should be used: If one disease is surely fatal (apart from all treatment), and the other is of less gravity, the former should be selected as the cause of death."
- "3. If neither of the above rules is applicable, then the following should be used: If one of the diseases is epidemic and the other is not, choose the epidemic."
- "4. If none of the preceding rules is applicable, the following may be used: If one of the diseases is *much more frequently fatal* than the other, then it should be selected as the cause of death."
- "5. If none of the four preceding rules apply, then the following should be used: If one disease, but not merely terminal condition, is of rapid development and the other is of slow development, the disease of rapid development should be taken."
- "6. If none of the above five rules apply, the diagnosis should be selected that best characterizes the case."

As stated by the Commission in the original text, the first rule is the one of most frequent application. Let us repeat this rule.

"If one of the two diseases is an immediate and frequent complication of the other, the death should be classified under the head of the primary disease."

This rule is followed throughout by the Bureau of Statistics and it is hard to imagine a case where the circumstances would lead us to abandon it on those common sense grounds which we must always be ready to put above formal rules.

As to the other rules, they are followed in general, though not without exception. For rule 2, the selection of the disease which is fatal without treatment, one example given by the Commission is pulmonary tuberculosis and puerperal septicaemia, tuberculosis being accepted under the rule. In this case the Bureau of Statistics would select puerperal septicaemia on the grounds of its importance and its preventability. The 3rd rule, the selection of an epidemic disease above one which is not, is followed in Canada in nearly every case. The 4th rule, the selection of the disease which is more frequently fatal, and the 5th rule, the selection of the disease of more rapid development, are valuable and logical, but somewhat vague in their nature, and will often have to give way to more specific rulings which we have adopted.

THE MEDICAL CERTIFICATE OF DEATH

It may be well at this point to describe briefly the form of medical certificate in use in Canada. The certificate calls for the "Cause of Death" and the "Contributory Cause", with the duration of each. Information is also required regarding operations and autopsy if these occur. It might be argued that the best method for the selection of a cause for tabulation would be to follow the choice made by the attending physician when he enters one disease under "Cause of Death" and another under "Contributory Cause". In practice, however, such a method would give so many divergent results that co-ordination and comparability of data would be impossible. When a train of diseases has brought about a death, many, perhaps the majority of certifying physicians are inclined to enter the terminal condition or immediate cause as the "Cause of Death", mentioning the condition or conditions which led up to this as the contributory cause or causes. Obviously the physician is not to blame for this; the terminal condition is in a sense the real cause of death;

but for statistical purposes we require rather the condition which started the train of diseases, to direct attention to the point at which preventive measures can be applied. We find it impossible, therefore, when two or more causes are mentioned, to base our choice for tabulation on the fact that one has been stated by the physician as the cause of death, and the other as the contributory cause, unless all other means of making a choice are absent.

We may now proceed to a more detailed discussion of our rules, and the most practical method appears to be that of taking in succession the main classes of causes of death. It must be kept in mind that none of our rules are without exceptions according to the known facts of the case as stated on the medical certificate. In general, as will be seen, the Dominion Bureau of Statistics has been inclined to follow the rules of the English Office.

VIOLENT DEATHS

The general rules of the International Commission made no specific mention of violent deaths. In the rules of the English Office these deaths have first place in the general order of preference. The modifications of this general preference are shown by the following quotation from the English Manual of 1912.

"Where any forms of violence and disease are jointly stated as causes of death, the violence is to be preferred, except in the following instances:

- "(a) Deaths from any definite disease stated to have been accelerated by accident are classed to the disease.
- "(b) Deaths during or resultant from operation, or the administration of an anæsthetic are classed to the disease or injury for which the operation was performed.
- "(c) Deaths from pneumonia or other lung diseases consequent upon accidental immersion are to be classed to the disease.
- "(d) Deaths from injuries received during an epileptic or apoplectic fit are to be classed to epilepsy or apoplexy, as the case may be.
- "(e) Deaths from tetanus, erysipelas, pyæmia, septicaemia, blood poisoning, etc., following an accident are to be classed to the disease if the injury was slight, such as "scratch" or "abrasion", but if the injury was apparently severe enough to kill by itself (*e.g.*, by vehicle, machinery, etc.), the death is to be classed to violence.
- "(f) Deaths from cancer and accident in conjunction are to be classed to cancer."

In Canada we follow the general preference thus assigned to violence, and accept all these modifications, with the exception of the preference given to deaths from cancer when cancer and accident are mentioned in conjunction.

For example, if a man suffering from cancer is killed in an automobile accident, we feel that the death should be classified as due to violence. However, when merely "fracture" is stated on the medical certificate in conjunction with cancer, as happens with a fair degree of frequency, particularly in the case of aged persons, we take into account the vagueness of this description of violence and assign the death to cancer.

GENERAL DISEASES

Included in this group are the infectious diseases. Following the English rules we give preference to general diseases over local diseases, except that aneurysm, strangulated hernia and intestinal obstruction, puerperal fever, puerperal phlebitis and puerperal diseases of the breast are classed for this purpose with general diseases. The general diseases are divided into four groups in order of their importance, and a disease in Group I is to be selected before one in Group II, etc. All of the diseases of local origin which rank in importance with general diseases are placed in Group I, that is to say, aneurysm, strangulated hernia and puerperal diseases mentioned above.

Within each group the disease of longest duration or the first mentioned in the certificate should, as a rule, be chosen. It may be mentioned that the

difficulty in choosing one of two or more causes of death would be reduced to a minimum if the duration of each disease were correctly entered in each case. This is, however, far from being the case. The omission to give duration is quite frequent, and in many other cases it is evident from the nature of the disease that what the physician has really given is not the total period of duration but the period during which he attended the patient.

Group I, with the additions mentioned, consists of the following: small-pox, cholera, glanders, anthrax, rabies, tetanus, cancer, chronic lead and other chronic poisoning, aneurysm, strangulated hernia and intestinal obstruction, puerperal fever, puerperal phlegmasia alba dolens and phlebitis, puerperal diseases of the breast, and other epidemic diseases of exceptional interest such as plague, yellow fever, leprosy, etc. To this group the Bureau of Statistics has added acute poliomyelitis, epidemic lethargic encephalitis and epidemic cerebro-spinal meningitis.

Group II consists of typhoid fever, typhus, relapsing fever, malaria, measles, scarlet fever, whooping-cough, diphtheria and dysentery. To this group we have added undulant fever. It will be noted that the four children's epidemic diseases, measles, scarlet fever, whooping-cough and diphtheria, are in this group.

Group III contains influenza, mycoses, tuberculosis (all forms), venereal diseases, acute rheumatic fever and Addison's disease.

Group IV consists of erysipelas, mumps, German measles, varicella, pyaemia or septicaemia, rickets, osteo-malacia, osteo-arthritis, gout, scurvy, diabetes, exophthalmic goitre, leucocythaemia, lymphadenoma, pernicious anaemia and other general diseases.

LOCAL DISEASES

In this group the most general rule which we follow is:

"Where two or more local diseases are certified together, that of longest duration should be preferred. If duration is not recorded, any disease of a chronic nature should be preferred to a disease not so characterized; if neither disease can be assumed to be chronic, the first mentioned on a medical certificate should be selected."

It frequently happens that the acute or chronic nature of a disease is not stated. If the duration of the disease is given, however, we classify a condition which has existed for more than six months as chronic. The converse of this rule cannot be so definitely applied, since we frequently find evidence that the duration given on a certificate is merely meant to indicate the period during which the certifying physician was in attendance.

This general rule is, however, employed only when the more specific rulings (which follow) regarding particular local diseases fail to apply.

DISEASES OF THE NERVOUS SYSTEM AND ORGANS OF SPECIAL SENSE

Progressive locomotor ataxia and general paralysis of the insane are selected in preference to their primary disease, syphilis, as being equally definite while at the same time showing the nature of the development taken by the disease.

Of other psychoses, dementia praecox is given a high order of preference in our system of selection, while the remaining psychoses would not be tabulated as a cause of death if any other definite disease of importance were on the same certificate.

The preference given to epilepsy over an accident resulting from an epileptic fit has been already mentioned under violence.

As between otitis media and mastoid, the latter is chosen, though the otitis media would naturally precede it in the sequence of causes. The greater fatality of mastoid and the fact that in nearly every case where it is certified as a cause of death an operation has taken place appears sufficient ground for our choice.

Cerebral haemorrhage, embolism or thrombosis is not tabulated as the cause of death if the heart or arterial condition which preceded and presumably led up to the cerebral haemorrhage is also mentioned on the certificate. Further, if cerebral haemorrhage, arterio-sclerosis and chronic nephritis are mentioned on the same certificate, the preference is ordinarily given to nephritis under the rule of choice between circulatory diseases and those of the genito-urinary system which will be amplified further in a later section.

Convulsions, which are included amongst diseases of the nervous system, but which are a symptom rather than a disease, rank very low in our order of choice and are not taken if any other definite cause of death is given on the certificate.

DISEASES OF THE CIRCULATORY, RESPIRATORY AND GENITO-URINARY SYSTEMS

We find it necessary to consider these classes together because in a considerable number of cases diseases in two or all three of these classes appear together on the medical certificate.

Amongst these classes of cause of death, the rules of the English Office give a special preference to lobar pneumonia. This preference was followed by the Bureau of Statistics until the latest Revision of the International List was applied to Canadian statistics in 1931, after which the special attention given to diseases of the coronary arteries in that Revision led us to a reversal of the earlier rule so far as these two diseases are concerned.

With the exception noted above, the general rule of the English Office on these groups is as follows:

"Any definite disease of the heart or kidney is to be preferred to any disease of the respiratory system."

The Bureau of Statistics, however, has modified this general rule as follows:

Where broncho-pneumonia or pneumonia unspecified and a heart condition appear together on a certificate, the death is classified in the Bureau of Statistics under the heart condition, except when it is clearly shown that the broncho-pneumonia was primary or its duration exceeds that of the heart condition.

On the other hand, bronchial asthma is given the preference over diseases of the heart muscles, though not over other specific heart conditions.

As between arterio-sclerosis and pneumonia, either lobar or broncho-pneumonia is given the preference. With pneumonia unspecified, however, we classify the death to arterio-sclerosis.

If arterio-sclerosis is reported together with a disease of the heart muscles, the cause of death is classified in the Bureau of Statistics under arterio-sclerosis; but if arterio-sclerosis is reported with a lesion of the endocardium, *i.e.*, endocarditis or valvular disease, the heart condition is taken as the cause of death.

As between nephritis and disease of the heart or arterio-sclerosis, the preference is given to nephritis, subject to the rule that a chronic disease will be accepted before an acute disease, which works out as follows:

- (a) Chronic nephritis is preferred to heart disease or arterio-sclerosis, except when the duration of the heart disease or arterio-sclerosis is stated as longer than that of the nephritis.
- (b) Chronic heart disease or arterio-sclerosis is preferred to acute nephritis.
- (c) Acute nephritis is preferred to acute heart disease.

In applying the above rules, nephritis unspecified as chronic or acute is taken to be acute when the age is under ten years and chronic when the age is ten years and over.

DISEASES OF THE DIGESTIVE SYSTEM

We have little in the way of formal rules for diseases of the digestive system, beyond the general rulings of the International Commission and of the English Office regarding the choice according to sequence, fatality and duration.

When death follows an operation, this fact generally justifies the classification of the death to the disease for which the operation was performed. Operations are, of course, frequent for diseases other than of the digestive system.

Perforations of the stomach and intestines have such high fatality that they are almost always chosen in preference to other diseases. For children under two years of age the importance of diarrhoea and enteritis is such that we accord it a very wide preference.

When acute gastritis appears on a certificate together with a heart condition, the death is classified to the heart condition. Acute indigestion is included with acute gastritis under this rule.

MALFORMATIONS AND DISEASES OF EARLY INFANCY

In the selection of causes of death in infants, age is an important factor.

Under three months of age the major congenital malformations and the definite diseases of early infancy, *i.e.*, premature birth, injury at birth, atelectasis, icterus neonatorum, sclerema and oedema neonatorum, athrepsia, are preferred to any disease except syphilis. The English Office makes further exceptions of the general diseases in the first two groups as enumerated in the early part of this paper, but the Bureau of Statistics, while not ready to affirm that no exception but syphilis will be made to the preference given these diseases of early infancy under the age of three months, finds in practice very few cases where the circumstances require another choice.

When the age exceeds three months any definite disease which is not presumably the consequence of a congenital defect will be preferred to the diseases of early infancy. The rank given to malformations at ages exceeding three months is difficult to determine, as it will largely depend on the nature of the statement made on the medical certificate. It may be noted here that over the age of three months icterus is no longer classified as a disease of early infancy but is placed amongst diseases of the liver; similarly, beyond that age, atelectasis is classed to diseases of the lungs, while above the age of one year congenital diseases of the heart are classed amongst the ordinary diseases of the heart.

It is important to note that among the malformations and diseases of early infancy premature birth is given the general preference over the other causes in these classes. Injury at birth stands next in order, while, with the exception of these two causes, major malformations have preference over diseases of early infancy.

PUERPERAL CAUSES

Cases arise in which the decision whether a puerperal cause or some non-puerperal disease should be chosen as the cause of death may be quite difficult. This is unfortunate, because the rate of maternal mortality is affected by such decisions. However, in the great majority of cases we are able to follow quite definite rules. The first of these, as stated above, is that puerperal fever, phlebitis and diseases of the breast are included with the most important group of general diseases for purpose of preference. Other definite puerperal causes also enjoy a high order of preference—though not above a serious infectious disease. Where a definite non-puerperal cause of death is given, however, and the certificate merely makes reference to pregnancy or childbirth without indicating any puerperal disease or abnormality, the puerperal state is treated as a contributory cause only.

Amongst the puerperal causes septicaemia is given the preference over

all others. For example, if septic phlebitis is given as the cause of death, we assign the death to No. 145 of the International List—puerperal septicaemia—rather than to No. 148—phlegmasia alba dolens.

The choice of puerperal causes has, however, been made easier and the tabulation more significant by the revision of the International List in 1929. Formerly, when a septic condition was mentioned with abortion on the certificate we had to make a choice between the two, and the preference being given to septicaemia, the tabulation failed to show that the death was associated with an abortion. The new list, however, makes two classes for abortions, those with septic conditions and those in which septic conditions are not mentioned.

In the Bureau of Statistics we have extended this division to ectopic gestation, so that we are able to get the total number of deaths associated with this abnormality without sacrificing the preference to be given to septicaemia.

CONTRIBUTORY CAUSES

It will be obvious that many details have been left unmentioned, but it is hoped that the main features of our system of selection will be understood from these explanations. It has already been stated that for special purposes we are able to tabulate cause of death in conjunction with a contributory cause. It frequently happens that more than two diseases or conditions are mentioned on a medical certificate. In this case, after selecting the cause of death for the regular tabulation, it becomes necessary to decide which of the remaining causes will be chosen as contributory. To quote from the "Physicians' Pocket Reference" issued by the Bureau, "A contributory cause which is independent of the disease named as the cause of death should be given preference over a mere terminal condition or mode of death following the main cause."

This instruction, intended for the physician certifying in the field, corresponds to the general rule followed in the office for the choice of a contributory cause. Where this rule does not apply, the choice is made in general according to those preferences which we have already stated for the choice of the main cause.

With violent deaths we seldom tabulate a contributory cause. Exception is made to this rule where it is stated on the certificate that the accident was brought about by the intoxicated condition of the victim. There are other occasional exceptions, chiefly in suicide, when a diseased condition provides the motive for the suicide. It may also be noted that deaths from criminal abortions are classified to homicide, and the puerperal condition of the victim is taken as a contributory cause.

We have already referred to the reasons which make it necessary for a statistical office to formulate rules of choice for guidance in the classification of causes of death. The Bureau will discuss with the provinces during the present year the possibility of a change in the medical certificate which might obviate much of the present difficulty in making a proper selection. It may be pointed out that both England and the United States have recently adopted new forms of medical certificate.

Modern Swimming Pool Construction*

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A DISCUSSION of the engineering problems involved in the construction of swimming pools includes primarily the consideration of the structural design of the pool and the enclosing building and of the mechanical equipment. It might be carried further to show how the general plan and arrangement are often controlled by structural features, but no attempt will be made to cover this branch of the subject other than to say that the nearer the ideal arrangement is attained the less conscious the patrons will be of the enclosing building.

This suppression of the structure does not apply to the architectural treatment of the pools, but if a high standard of beauty and luxury cannot be afforded, at least every precaution should be taken to avoid unsanitary, unpleasant or embarrassing conditions, as it takes so little to make a pool repulsive.

There are many types of pools for many different purposes, each with recognized standards of proportions and design. When, however, a public pool has to be designed to serve all purposes, there is room for considerable difference of opinion as to what is best.

Capacity of Pool

The rules of the American Public Health Association for swimming pools classify bathers as divers, swimmers or non-swimmers. No cognizance is taken of age. These rules are quite satisfactory for semi-private pools (clubs, et cetera), but for the municipal pool they are too conservative. Here children usually constitute the peak load. In a municipal pool the bathers may also be divided into three classes, but there is some difference in the classification and in the accommodation each requires.

The first class is composed of young children and timid beginners who cling to the edge of the pool and to the three foot depth. Those who have more confidence and are learning to swim venture into the four or five foot water, but they must be able to touch bottom. Others, who can swim with confidence, like to dive. Thus we have beginners, non-swimmers and divers, with no division between those who can swim and those who cannot. Usually the divers constitute such a large proportion of the patrons that it is not possible to provide, as the rules of the American Public Health Association recommend, a diving board for every twelve persons. The best that can be done is to have one or more boards, as the size of the pool warrants. To facilitate the use of the board by a large number of persons, it is desirable that the pool be sufficiently large to permit the diver to swim away as soon as he comes to the surface. The diving area likewise should be distinctly marked off to prevent divers diving among non-swimmers.

*Presented before the Section of Public Health Engineering at the Twenty-First Annual Meeting of the Canadian Public Health Association, Toronto, May, 1932.

The capacity of a pool is dependent on factors other than the water area. Such details as the area of the sidewalks and the length of the shore line also demand consideration. In designing a pool for a definite capacity the best guide is, of course, the study of existing pools, noting particularly where congestion occurs that limits capacity. As swimming is a sport as well as a recreation, the proportions of a pool are usually determined, in the first place, by sport requirements. After that it is a question of cost, maintenance, possible revenue and public policy.

Dimension of the Pool

When the length of the pool is not otherwise fixed, it is preferable to make it some multiple of one hundred yards, a distance recognized throughout the British Empire and the United States as suitable for a race of any length. Whatever the length, it is worth while to have it exact, even if only for the satisfaction of the swimmer in training.

For a pool twenty-five yards or more in length, a width of fifteen yards is satisfactory, for the following reasons.

1. The cost per square foot is less for a wide pool, since the length of the enclosing wall is shorter. (This saving is lost in the case of an indoor pool, as the longer roof truss is correspondingly more expensive.)
2. The pool will accommodate a larger number of contestants in a race.
3. In such a pool, the lineal feet of wall adjoining the shallow water is greater; consequently there is more accommodation for timid beginners and children.
4. Fifteen yards is a convenient length for children's races.
5. The diving board may be placed at the side of the pool at the deep end, where it does not interfere with racing events or the non-swimmers.
6. The timid bather will always feel that he is not far from the wall.

In the case of an exhibition pool, a width of forty-five feet will, of course, afford a better stage for fancy swimming, drills, et cetera, and a better line of sight for the audience.

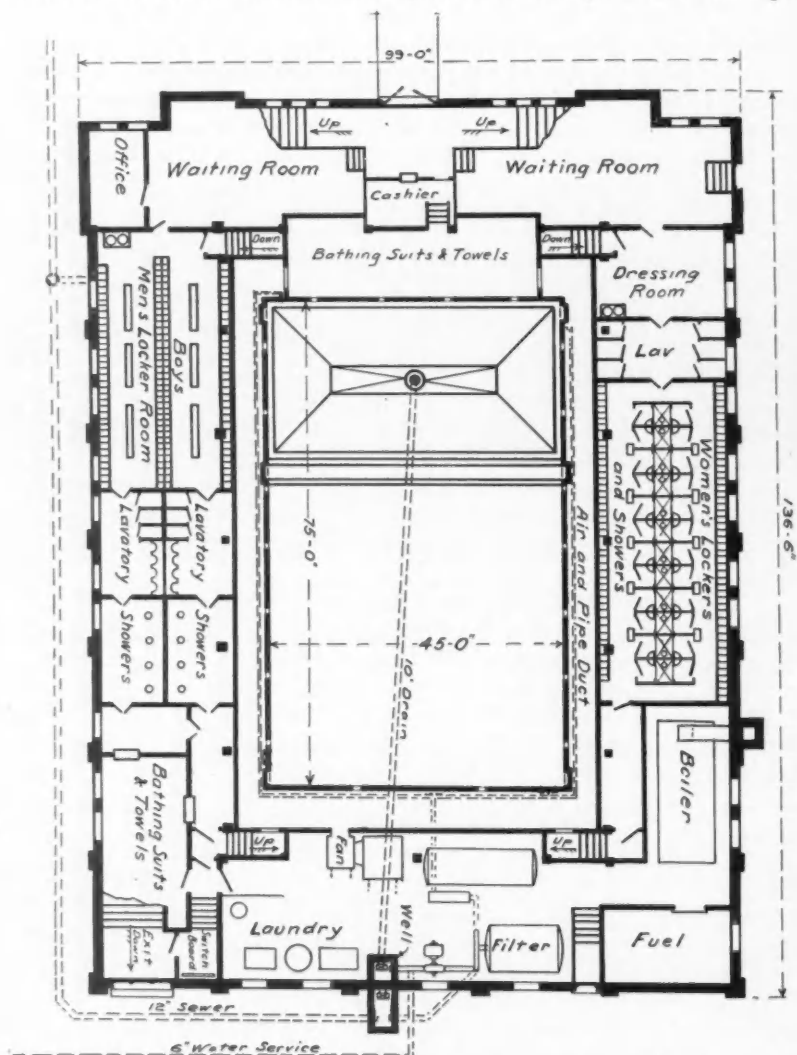
THE POOL AT HAMILTON, ONTARIO

The Municipal Swimming Pool in Hamilton, Ontario, serves as a good illustration of pool design in general. Of the proportions recommended above, it was built primarily for the natatorial events of the first British Empire Games held there in 1932. It is, accordingly, an exhibition pool and provides seating accommodation for twelve hundred spectators. At the same time, it was essential that it serve efficiently as a municipal pool and meet, in the best possible way, the requirements of all classes of patrons. Estimated in accordance with the rules of the American Public Health Association, the capacity of the pool would be limited to one hundred and twenty-two, but as a matter of fact it can accommodate several times this number without serious congestion.

The Grandstand

A reinforced grandstand extends around the pool for the accommodation of spectators. The line of sight affords everyone a view of the swimmer in

the nearest lane in a race. With the exception of about 15 per cent, the spectators have a good view of the diving boards. The seats are three-slat benches of California red wood. The space beneath the grandstand is occupied



Plan of the Municipal Swimming Pool, Hamilton, Ontario.

by the entrance, the cashier's wicket and waiting rooms at the front, the men's and women's locker rooms on either side, and the heating, filtering and laundry equipment at the rear. While not ideal in some details, this arrangement is economical and efficient.

Concrete Construction

The design and construction problems of a reinforced concrete pool are much the same as for any concrete tank, except that troubles arising from expansion and contraction are increased when the pool is a large one. In the Canadian climate an outdoor pool presents an additional problem, that of ensuring resistance to frost action and ice pressure. The pool must be watertight, and as the use of a membrane lining is impracticable, every precaution must be taken to prevent cracks.



Exterior of the Hamilton Pool Building.

The Cause of Cracks

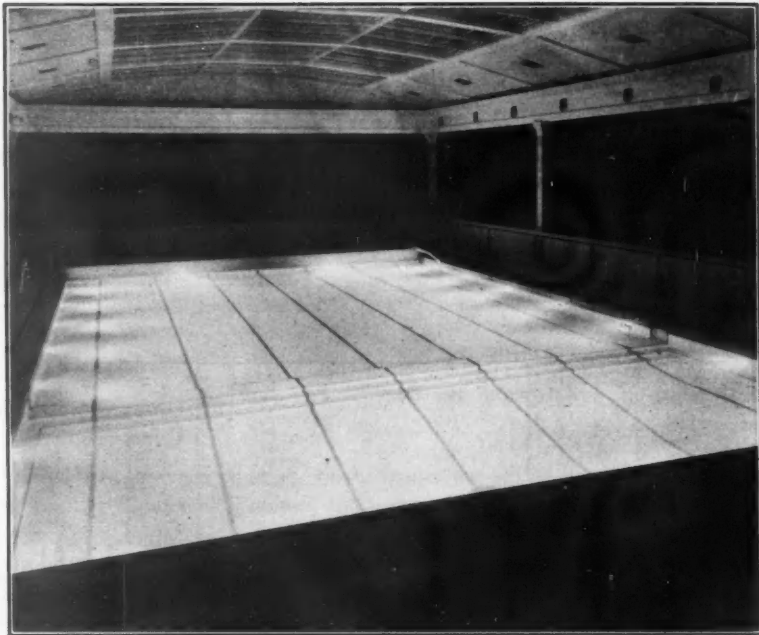
Cracks are caused by the movement of one mass of concrete in relation to another. In every engineering structure some motion is inevitable, as materials will extend or contract under stress or change of temperature. Moreover, concrete shrinks in drying. Whatever the cause, every strain must be considered and counteracting forces arranged to restrain the motion. Where movement is restrained but inadequately provided for, there will be cracks, and it is necessary to reinforce all corners and all points where there is a change in section or a break in line, and to provide ample reinforcing steel to resist tension and bending. The possible stress due to change of temperature should be estimated, although usually it is not necessary to provide reinforcing to take more than fifty per cent of this stress. For indoor pools the usual practice is to provide steel equal to .025 per cent of the concrete area of section, but this is a matter for individual judgment. In pools more than one hundred feet in length, expansion joints should be provided, but they must be designed with great care.

Pool Walls

For watertight construction, the walls must not be too thin. The cost does not vary proportionately with the thickness of the wall; reducing an eight inch wall to four inches would not save ten per cent. It is much more difficult to work concrete around reinforcing in a four inch wall and prevent segregation

of the aggregate and the formation of air pockets. Moreover, a pocket that would not be noticed in an eight inch wall would cause considerable trouble in one half that size.

In work that must be waterproof, wires should not be used to tie forms together, as water will follow twisted wires through many feet of concrete. In Hamilton the forms were supported by wale timbers held in place by half-inch bolts which were removed after the concrete had set. After the forms were removed, the holes were plugged.



The Pool.

Walls should be poured in uniform layers all around the pool, with no vertical joints. If the latter are essential, they should be treated as expansion joints. Floors should be poured in one continuous operation. If their size makes this impossible, they may be poured in alternate sections, but even with the utmost care it is difficult to prevent the occurrence of shrinkage cracks between sections of concrete poured at different times.

Construction is simplified if the side walls of the pool are built first. When the forms have been stripped, the sub-grade may be prepared and the floor laid. The joint between the floor and the wall is made by extending the wall footing to support the slab and to prevent it from settling, and by placing dowells in the wall to tie the slab to it. The joint between the wall and the slab should be sealed carefully when the work is dry. An essential feature is

the four inch weap tile laid all around the wall footing. This should discharge into a manhole, where any leakage can be noted.

Concrete Mixture

If all such details are carefully supervised and the concrete is properly graded on the water-cement ratio specifications, no admixture need be used to ensure a watertight job. However, as it is not always possible to choose one's contractor on a public work, it is advisable to specify the use of one of the less expensive materials to improve the workability of the concrete as insurance against carelessness in placing and working.

Duct Space

To drain the pool to the street sewer and to get headroom under the grandstand, the pool was set well out of the ground. This not only reduced excavation to a very small item, but it also left a space under the sidewalks around the pool. This was used to great advantage by converting it into a duct in which were placed drain and water pipes and by which access is obtained to the units of the underwater lighting system. The duct also serves as a cold air return in the heating system.

Scum Gutter

The scum gutter serves the double purpose of a gutter and a sidewalk drain. It is less expensive than the usual side wall gutter and saves a foot of wall all around the pool. Not only is it convenient for bathers to have the side walls only six inches above water so that they can climb out at any point, but the appearance of the full pool is also pleasing. There is no gutter along the end walls of the pool, as these walls had to be built up eighteen inches above water level to give a good "take off" for racers and to provide an unbroken wall on which to make the turn at the end of the lap. Although this has cut down the length of the gutter in proportion to the area of the pool, the gutter has been found quite sufficient.

Pool Bottom

The pool slopes from a depth of three feet at the shallow end to five feet at fifty feet, which is two-thirds of the length. The bottom of the remaining twenty-five feet is a hollow pyramid with a maximum depth of ten feet. Dividing the shallow area from the deep are two nine inch steps which warn the non-swimmers of the deep water beyond. As water extends three and a half feet above them, these steps do not interfere with swimming events or any other use of the pool, but provide separate pools for divers and non-swimmers.

The bottom of the deep area slopes up to the side wall, as well as the end wall. This makes it possible to have the footing of the side walls at about the same elevation all around the pool, and the greatest water pressure they have

to withstand is not more than five feet. Around the deep area, at a depth of four and a quarter inches, is a nine inch step which affords convenient support for a tired swimmer or one seized with cramps. The side slope and the step occupy space otherwise of little value and not only effect a saving in the first cost but also reduce by four per cent the amount of water required to fill the pool and the capacity of the filter.

The Building

The building enclosing a pool must be designed for unusual humidity conditions. The temperature of the air over the pool is maintained at 75 degrees F. and in the presence of a large body of water at 70 degrees it is never far from the saturation point. If the air is saturated 90 per cent at 70 degrees and it comes in contact with cold air next the wall at 65 degrees, it will deposit moisture and the wall will become damp. The walls of the Hamilton pool, being merely curtain walls and carrying no load, are constructed of four and a half inches of brick and eight inches of cinder block and plastered on the inside. In average winter weather the temperature of the air outside is 32 degrees and the insulating value of the wall is such that under this condition the air in contact with it inside is about 64 degrees, so that little or no moisture collects on the wall. In zero weather, however, the inside air would be reduced to 55 degrees, and were it not for the fact that the heating system of the building directs hot air against it, the wall would drip with moisture. To take care of this condition by insulation would require insulation equivalent to two inches of cork. No special insulation, other than the air space, was used for the roof, but as the air in contact with it is about 100 degrees, there is no trouble from condensation.

Finish for Interior

All the interior finish should be waterproof, as for outside construction, not only to resist the action of the damp atmosphere but also to permit the use of a hose to wash the walls. The windows must be double glazed, or they will drip continually. Unless the metal work is brass or bronze, it will have to be painted with acid-resisting paint to withstand the traces of chlorine that will be in the air, if the pool water is chlorinated.

Acoustics

In a large room finished with hard smooth materials the acoustics are not the best and there is likely to be prolonged reverberation from every sound. Sound-absorbing materials, however, should be used with care, for if they are porous they will be as objectionable as porous insulation. In the Hamilton building the plaster on the walls and ceiling was given a rough texture finish, and, as the wooden seats and the grandstand recess itself absorb a certain amount of sound, the acoustics are not bad. Indeed, a certain amount of reverberation in a swimming pool is desirable and it would be unwise to spend money on sound correction.

The Water Circulating System

The pool is drained from the deep end by a ten inch pipe leading to a well at the rear of the building. In this well the water stands at the pool level. The well has a twelve inch connection to the street sewer, and by this the pool can be drained in an hour and a half. Water is supplied by a six inch city service and can be passed either through the filter or directly into the pool by turning it into the well. The filter is backwashed by city water reduced to the proper pressure.

The circulating pump draws the water from the well through a hair catcher and forces it through the filter and thence through the pool heater to the pool. It is admitted through four outlets, one in each wall a few feet from each corner. As these are set at right angles to one another, the incoming water gives a rotary motion to the pool which distributes the warm water and sweeps the side walls and bottom. The value of this current is demonstrated in that it has been necessary to empty the pool only once every six months and then only to scrub off a slight yellow stain which collects on a small area on the bottom where the water may not be circulating rapidly enough.

The capacity of the circulating pump and filter is two hundred and twenty imperial gallons per minute, which passes the water of the pool through the filter and the heater three times a day. Continuous operation of the filter is not necessary when the bathing load is light, but in maintaining the temperature of the water and the residual chlorine constant, this frequent turnover is better than adding less but hotter water containing more chlorine. The pump has by-pass connections so that it may be used as a suction pump to operate a vacuum cleaner for which connections are provided below water level on each side of the pool.

Heating Plant

The heating plant consists of one 72" \times 18' tight firebox boiler which burns a low grade of coal. As a forced draft is used, the height of the stack is only forty feet. A steam pressure of six pounds, automatically controlled, is sufficient for all purposes except for the steam dryer in the laundry, which requires seventy pounds' pressure. This is provided by a small gas-fired boiler which also heats the water for the laundry, thus making the latter independent of the general heating plant.

The pool water is heated by steam from the boiler by means of a two-pass generator with a capacity sufficient to heat 250 gallons per minute from sixty-five to seventy-five degrees. It is automatically controlled.

To supply water to the showers a hot water tank 66" \times 17' is provided, holding a reserve of two thousand gallons. It is heated by steam coils in the tank which have a capacity of one thousand gallons per hour, heating water from fifty to one hundred and eighty degrees. Each shower is provided with a mixing valve by which the user can control the temperature of the shower water. It would, of course, be more economical to have the water automatically controlled at a medium temperature.

Hot Air Heating System

The building is heated by a combination system of hot air and steam coils. Cold air is drawn through a fresh air duct over a bank of steam coils by a fan, and distributed to the pool room through ducts concealed between the ceiling and the roof. It is discharged at adjustable louvered outlets which direct it along the ceiling over the pool and against the exterior walls of the building. The air enters at a temperature of 100 to 110 degrees and, cooling as it descends, maintains a temperature of about 75 degrees at the pool. It is drawn off at the stairs in the four corners of the pool room and returns to be reheated through the cold air ducts under the sidewalks. In both shower rooms is an exhaust fan which draws off the steam and creates a current through the lavatories and locker rooms, later discharging to the open air. When more ventilation is required, the ventilators in the windows are opened on the lea side of the building, fresh air drawn in over the steam coils and the foul air driven out. Thus no cold air is permitted to enter directly into the building to cause condensation of steam or discomfort to the bathers. Additional steam coils are provided in the locker rooms, et cetera, and unit heaters with circulating fans at the front entrance, where additional heat is required to keep the air at the proper temperature.

Laundry

The laundry is equipped with a 36" \times 54" washing machine, a 26" centrifugal extractor and a 30" \times 42" drying tumbler, in addition to the gas boiler mentioned above. This equipment easily takes care of the bathing suits as they are returned by the bathers on even the busiest day.

Lighting System

An ineffective lighting system will nullify all other efforts to make a pool attractive. The lighting system of the Hamilton pool is probably its most effective feature. Sixty per cent of the ceiling over the pool is skylight glazed with a highly refracting glass which gives outdoor illumination during the day. Over the skylights are powerful lights with reflectors that light the pool brilliantly at night, without any dazzling reflection from the water. The crowning feature, however, is the underwater lighting. Twenty 300-watt lights are set around the pool below water level behind thick glass port holes twelve inches in diameter. For spectacular effects these lights are switched on and all the others turned off, except for a small amount of ceiling light without which the portions of the swimmers above water would appear black against the light of the pool. To obtain the best results, the pool should be lined with white tile and the water must be perfectly clear. The expense of underwater lighting is, of course, warranted only for an exhibition pool.

The Diagnostic Clinic in Pathology in the Control of Cancer*

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OUR lack of knowledge with respect to the cause and the underlying nature of cancer is possibly the greatest obstacle retarding effective control of this disease. Such ignorance, however, cannot exonerate us if we fail to take all possible steps to control this scourge. A second factor which militates against effective control is the insidious onset, the long quiescence and the absence of symptoms, so that in many instances the patient is beyond hope of satisfactory treatment when first he presents himself for medical attention. We believe that much has been done to encourage the patient to recognize and report early suspicious symptoms. It must, however, be admitted to the discredit of the medical profession that, without adequately utilizing the available facilities for determining the nature of a sore or lump, practitioners occasionally assure their patients that they are not suffering from an early malignant process. Nor do such events take place only in remote municipalities where histological analysis of tissues is not immediately available. A case has recently been called to our attention in which a woman in Toronto consulted her physician concerning a lump in her breast. He assured her that it was of no significance. Fourteen months later she was admitted to one of our larger hospitals suffering from an inoperable cancer of the breast. This patient has recently died as a result of this malignant process.

From the known facts of the genesis and natural progress of a malignant tumor it is apparent that the hope of effective cure rests very largely upon the early recognition of the nature of the process with which the patient is afflicted, before that process has become widespread. In almost every untreated case the tumor tends to become distributed through various tissues and organs. As with the primary tumor itself, so with metastases, the very earliest development cannot be determined by physical examination. Single tumor cells or small clumps of cells produce no symptoms in the various tissues in which they may lodge. There is a time, whether over a period of a few days or at an actual moment, when a tumor no longer remains local. It is therefore essential that the medical attendant should diagnose the condition as early as possible in the hope of administering appropriate treatment before dissemination of the tumor has occurred.

Danger of Delay in Diagnosis.

The public is being trained to view with suspicion any lump or any ulcer which does not tend to heal, and to realize that the chief fear of cancer should be fear of delay. The medical practitioner should not be outdistanced in this respect. Quoting from Lombard's conclusions in cancer studies in Massachusetts,

*Presented at the Twenty-First Annual Meeting of the Canadian Public Health Association, Toronto, May, 1932.

we find that "the greatest single cause of delay between consultation with a physician and the institution of adequate treatment is because of poor advice on the part of the attending physician". Not a few malignant tumors have been overlooked in their early stages because they lacked certain of the characteristics found in fully developed carcinomata. A practitioner who waits for fixity of a tumor to the surrounding tissues or for enlargement of regional lymph nodes without having used all methods of diagnosis has lessened the chances of his patient for cure. Not every mass is a malignant neoplasm. Some tumors or swellings are inflammatory, some are cysts, and still others are benign new growths. These are not always easily differentiated upon physical examination.

The introduction of the X-Ray into the field of intra-abdominal and intra-thoracic diagnosis has been a boon to mankind. By this method the presence of malignancy may often be established in suspected cases, and even when unexpected. This method of diagnosis, however, depends upon visualizing the gross characters of the lesion, so that the tumor is well established before it is recognizable by this means.

Diagnosis by Microscopic Examination.

Since malignant tumors consist of cells of the individual, it is evident that an analysis of the cells of a suspected area will afford the earliest possible opportunity for a recognition of malignant properties if such are present. The individual cells of a malignant tumor show increased vegetative qualities, as evidenced by a variety of digressions from the normal. Collectively they show disorderly arrangement, one to the other, and to the surrounding stroma. Invasive properties are frequently a striking feature. At times, even after careful study of the cellular structure, a certain degree of doubt may exist as to whether one has to deal with a very early malignant tumor or with a pronounced hyperplasia from some unknown cause. There is an ill-defined border zone between physiological and pathological hyperplasia, and between reparative and neoplastic proliferation. These border line cases are relatively few, and in the vast majority the presence or absence of malignancy may be appraised accurately upon histological analysis of the tissues by a competent pathologist. In this way the recognition of malignancy may be accomplished at a stage when the neoplastic process is as yet local and at a time when treatment may be undertaken with a reasonable hope of cure. The problem of the control of cancer would be rendered much less baffling if all cases could be recognized when in this early localized state, and the chances of survival would be greatly increased. In the absence of any specific preventive measures, early diagnosis assumes the place of paramount importance in the control of cancer. It is in relation to the early recognition of malignancy that the diagnostic clinic in pathology assumes its most important rôle.

The histological analysis of tissues is of value not only in establishing a diagnosis of cancer in an early stage, but it also serves a purpose in ruling out malignancy in certain inflammatory processes with an associated tumefaction or swelling to a degree sufficient to cause the practitioner to suspect the presence of cancer. The removal of some of the tissues in such cases is fully justified

by the reassurance to the patient when the fear of malignancy has been definitely removed. Moreover, the examination of such tissues has from time to time been instrumental not only in circumventing mutilating operations, but also in indicating the treatment appropriate to the disease.

Since the criteria upon which a histological diagnosis is based depend upon propensities of growth as indicated by cellular morphology and the relationship of tumor cells to the surrounding tissues, judgment and care should be exercised in removing tissues for examination. Qualities of growth are usually most pronounced toward the periphery of a tumor mass, and the cells in this zone are less compressed and distorted. Moreover, necrosis of tumor cells is less marked near the boundaries than toward the central area. A further advantage found in tissues from the periphery of a tumor mass is the opportunity afforded for the recognition of invasive characters. If the suspected area is an ulcer, be it of skin or mucous membrane, the tissues should be removed in a block from the margin of the ulcer. This block should be cut perpendicularly to the surface, and should include some of the underlying tissues. Specimens removed from the base of an ulcer are frequently over-run by fibrosis or inflammatory infiltration and may no longer present tumor cells. Scrapings from the margins of an ulcer frequently include only the superficial layers of epithelium upon the malignant qualities of which it may not be possible to express an opinion.

Subsequent to their removal from the body, living cells or tissues tend to degenerate, thereby losing the finer details of their cellular structure. It is therefore essential that such tissues should be placed at once in a suitable fixing fluid so that the microscopic examination may yield reliable information regarding the nature of the lesion. Ten per cent formalin is a satisfactory fixing fluid and is easily obtainable. It does not cause undue distortion or shrinkage of the cellular elements, and permits of satisfactory staining procedures. Such fixatives as carbolic acid or strong alcohol leave much to be desired, as they cause coagulation or dehydration of the tissues with a masking of cellular detail. It is also desirable that tissues be placed in a considerable bulk of a fixing solution; otherwise, as the fixative penetrates the tissue, it becomes diluted to a concentration less than is required for adequate preservation.

The Value of Biopsy.

Because of the danger of spreading a malignant process through the tissues in a mechanical way by the surgeon's knife, we do not favor the indiscriminate incision of every tumor mass. We do believe, however, that even in those cases selected for treatment by radiation alone all available methods for establishing the diagnosis should be utilized. It may be very comforting to the patient if a lump has been made to disappear by radiotherapy, but what actual advance has been made unless we are sure of the nature of the original mass? It is gratifying to note that the radiologist favors the judicious excising of tissue for confirming the diagnosis so that the results he obtains may be beyond dispute. In the field of establishing a diagnosis of malignancy even in a well

advanced tumor the diagnostic clinic in pathology is the final court of appeal, just as it provides the most reliable method for the earliest diagnosis.

Exploitation by Quacks.

The very fact that so little is known regarding the cause and modes of development of cancer has made the exploitation of this field a simple matter for the quack, whose chief stock-in-trade is a self-advertised profound knowledge of everything pertaining to neoplasms, even to a complete understanding of a method of treatment and cure. Many a patient has turned to such persons rather than to an accredited medical practitioner because of the greater apparent certainty and optimism on the part of the quack. Some such patients are undoubtedly suffering from malignancy, and these constitute the failures that even the charlatan is forced to admit. A goodly number of individuals, however, submit themselves to various courses of cancer cures with only a self-diagnosed condition which these fakers are quick to corroborate. The latter hold the pathologist in very low esteem, knowing that a careful study of many of their cures would show them to be due to a changed mental state in the patient, with subsequent relief from an imaginary disease, rather than to the eradication of a cancer. There are those in this province to-day who are enriching themselves by playing upon the widespread fear of cancer. A number of cases have recently come to our attention where one of these quacks had convinced his patients that small pieces of undigested vegetable material passed by bowel were in reality the cancer which was being eliminated, "roots and all", by his method of treatment. It is a simple matter for the pathologist to determine that such fragments are not human tissue but represent varieties of food which the patient has ingested.

Provincial Diagnostic Service in Ontario.

The histological analysis of tissues is a service rendered by the diagnostic clinic in pathology. Until recently such a service was not readily available to the medical practitioners of the province of Ontario. The Department of Health has recently established a Division of Pathology which is prepared to examine such tissues as may be submitted, including specimens of tumors or of suspected tumors. The most modern equipment has been installed so that diagnosis may be made as rapidly as is consistent with accuracy, to the end that in those cases found to be malignant, adequate treatment may be undertaken with a minimum of delay.

The early diagnosis of cancer is not an end in itself, since it alone cannot accomplish the much-to-be-desired reduction in the death rate from this disease. This must immediately be followed by treatment appropriate to each case. Such early recognition, however, renders treatment much more successful. We believe that it is upon the fundamentals of constructive education and the application of histopathological methods for early diagnosis, followed by immediate and adequate treatment, that the effective control of cancer will be achieved. With these foundations to build upon, and recognizing that many deaths result from lack of adequate facilities for the diagnosis and management of all types of cancer, the government of the province of Ontario is taking steps to meet the cancer problem in a practical way.

Observations on Tuberculosis Statistics in Canada, 1921 and 1931*

R. E. WODEHOUSE, O.B.E., M.D., D.P.H.

Executive Secretary, Canadian Tuberculosis Association, Ottawa

IN September, 1922, the first issue of the Canadian Tuberculosis Association's quarterly *Bulletin* presented a table prepared by the Dominion Bureau of Statistics, showing all the tuberculosis deaths in the registration area by population, age groups, sex, and under seven clinical headings. The publication of the statistical data in this form has been continued annually; the populations in age groups and by sex are available every ten years in the census reports, namely, for 1921 and 1931.

This first table, based on Dominion census figures for population, shows five provinces with death rates from all forms of tuberculosis of over 75 per 100,000 population. Strange to say, the five provinces were those bordering on salt water—Quebec, Nova Scotia, New Brunswick, Prince Edward Island and British Columbia. The four provinces in the east had rates of over 100 per 100,000 and these provinces had the lowest ratings for tuberculosis treatment beds (beds per 100 deaths annually) in Canada. This gave our Association an impetus to special effort for anti-tuberculosis work in these areas. Funds to finance this field work were given by the Canadian Life Insurance Officers' Association.

The vital statistics for 1931, published in September, 1932, showed that the three Maritime provinces now had death rates, for all forms of tuberculosis, below 100 per 100,000 population, and that the rate in Quebec had been materially reduced. A summary of the total number of beds available, prepared in 1932, showed Prince Edward Island raised from a zero rating to 73 beds per 100 tuberculosis deaths each year, and Nova Scotia and New Brunswick as having more than one bed per death. Nova Scotia and New Brunswick are also the only provinces in Canada with more than 100 treatment beds available per 100,000 population.

Mortality Under 15 Years of Age

In our *Bulletin* for December, 1923, an interesting table was presented showing the percentage that tuberculous deaths under 15 years of age constituted of the total number of tuberculous deaths. Through the hearty co-operation of the Dominion Bureau of Statistics and the immediate assistance of Mr. W. R. Tracey, data for 1931 have been prepared. These are shown in Table I.

*Presented before the Section of Vital Statistics at the Twenty-Second Annual Meeting of the Canadian Public Health Association, Saint John, N.B., June, 1933.

TABLE I

PERCENTAGE OF TUBERCULOSIS DEATHS THAT THE AGE GROUP UNDER 15 YEARS FORMS OF THE TOTAL FOR ALL AGES

Year	Can.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1921...	14.5	16.4	12.1	12.1	16.3	10.9	21.2	15.5	23.6	11.8
1931...	15.3	10.3	13.7	9.1	15.3	9.8	18.9	26.7	29.1	18.5

A study of this table indicates unexpected changes which require explanation. The percentage for the Dominion is higher in 1931 than in 1921. Similarly, the figures for 1931 are higher in Nova Scotia, Saskatchewan, Alberta and British Columbia, whereas little change is recorded in the percentages for Ontario, Quebec and Manitoba. It is evident that the varying percentages are the results of influences not uniformly effective in all provinces. By presenting the deaths in this age group as specific rates (Table II), a truer picture of the effect of the anti-tuberculosis work in this age group is obtained. Actual increases in the death rate appear only in Saskatchewan, Alberta and British Columbia.¹

TABLE II

TUBERCULOSIS DEATH RATES PER 100,000 POPULATION
UNDER 15 YEARS OF AGE

Year	Can.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1921...	37	73	48	37	53	26	40	17	35	32
1931...	36	25	43	21	48	18	37	27	46	70

Considering the population of these three provinces, it must be remembered that the various racial groups—North American Indians, East Indians, Chinese and Japanese—are an important factor. In British Columbia the mild climate attracts many tuberculosis patients from other provinces, thus influencing the provincial death rate from this disease.

In studying the mortality in this age group under 15 years, it has been helpful to exclude the deaths of Indians and half-breeds. The importance of tuberculosis in the Indian population in this age group is shown by Dr. R. G. Ferguson, Director of Medical Service of the Saskatchewan Anti-Tuberculosis League, in the following paragraph from a recently published report.

¹The registration of the deaths of Indians was very small in 1921, totalling 506, unclassified as to disease, and therefore not included in tables. In 1931, they totalled 2,033, were classified as to disease, and are included in Tables II and III.

"A study of tuberculosis among the Indians in Saskatchewan has shown that the maximum sickness and death rate from this disease occurs in the age period between ten and fourteen years. This being included in the school period shows that the most important problem in the prevention of tuberculosis among these Indians is the prevention of tuberculosis among the school children. If the children are kept healthy during their period of residence in the boarding schools, between the ages of six and seventeen, only a small proportion will break down with disease afterwards."

TABLE III

TUBERCULOSIS DEATH RATE PER 100,000 POPULATION
AGE GROUP UNDER 15 YEARS, INDIANS AND HALF-BREEDS EXCLUDED

Year	Can.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1921...	35	66	47	35	52	23	37	16	31	32
1931...	27	21	42	21	47	14	21	13	13	30

It is noted at once from Table III that the death rate for Saskatchewan, Alberta and British Columbia in the age group under 15 years now shows a definite decrease from the year 1921, in place of the marked increases in Table II, when the entire population under 15 years was included. All increases in death rates in Table II have been removed. However, the fall in the rate for Nova Scotia, Quebec and British Columbia is not as great as that evidenced in other provinces. In British Columbia the racial and climatic influencing factors previously mentioned offer an explanation, but similar explanations cannot be offered for Nova Scotia and Quebec.

Mortality, Age Group 15 Years and Over

For comparison, Table IV has been prepared, presenting the tuberculosis death rate for all forms per 100,000 population for the years 1921 and 1931 in the age group 15 years and over (excluding Indians and half-breeds).

TABLE IV

TUBERCULOSIS DEATH RATE PER 100,000 POPULATION
15 YEARS AND OVER, INDIANS AND HALF-BREEDS EXCLUDED

Year	Can.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1921...	114	178	177	145	166	89	84	60	63	99
1931...	86	102	128	115	145	60	59	35	40	83

The four eastern provinces, Prince Edward Island, Nova Scotia, New Brunswick and Quebec, show very high rates both for 1921 and 1931, as compared with the rate for Canada as a whole.

Mortality, All Ages (Excluding Indians and Half-Breeds)

With the exclusion of the Indians and half-breeds, tuberculosis per 100,000 population (all ages) shows a marked fall in the year 1931, as compared with 1921, in all the provinces. The fall in British Columbia, however, is least, probably because of the factors already mentioned.

TABLE V
TUBERCULOSIS DEATH RATE PER 100,000 POPULATION
ALL AGES, INDIANS AND HALF-BREEDS EXCLUDED

Year	Can.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1921...	87	141	133	106	123	69	66	42	51	80
1931...	68	76	100	81	110	47	47	27	31	70

Mortality Rate, Indians and Half-Breeds

It is evident from the foregoing table that in any study of tuberculosis mortality in Canada the deaths among Indians and half-breeds must be carefully considered. The following table presents data concerning Indians and half-breeds in two age groups for all provinces.

TABLE VI
INDIANS AND HALF-BREEDS IN CANADA

Areas	Under 15 Years of Age		Over 15 Years of Age	
	Percentage of total population in this age group	Percentage of total tuberculosis deaths in this age group	Percentage of population all races	Percentage tuberculosis deaths from those all races
Can.....	1.4	24.1	1.0	6.1
P.E.I.....	0.3	14.3	0.2
N.S.....	0.5	2.8	0.4	2.2
N.B.....	0.5	3.2	0.4	2.3
Que.....	0.5	1.4	0.4	0.6
Ont.....	1.2	21.3	0.7	4.9
Man.....	3.0	44.4	1.9	20.4
Sask.....	2.0	52.9	1.5	13.8
Alta.....	2.7	73.0	1.8	28.0
B.C.....	5.6	59.7	2.9	19.1

DISCUSSION

Four questions arise in consideration of the statistical data presented.

Why, in Table III, is there less difference in the death rates for 1921 and 1931 in Nova Scotia and Quebec than in New Brunswick? My suggestion is that the 1,000,000 population of Greater Montreal contributes a gross tuberculosis death rate which affects the whole of Quebec and even Canada. It has had a tremendous shortage of treatment beds for the tuberculous and still has this shortage, with the resulting lack of segregation facilities for open infective cases from homes with many children.

Until recently, Nova Scotia has not had enough treatment beds available. Moreover, not enough cases, from destitute homes with a number of susceptible children, were being segregated in the available sanatorium beds, because the municipalities did not pay their share for the maintenance of their indigents in the sanatoria. But if you will compare Table III with Table V, you will be surprised to find that, in the all-age groups, Nova Scotia shows a higher percentage drop in the tuberculosis death rate than does New Brunswick.

Why has Alberta's white death rate, as shown in Tables III, V and VI, compared so favourably with that of Saskatchewan? In view of the complete programme now in operation for several years in Saskatchewan, it is difficult to explain why Alberta has comparatively such a good showing. Alberta has not spent nearly so much money, provided so many professional workers, or provided treatment bed facilities equal to those of the province of Saskatchewan. Nor have the people of Alberta had a municipal pool working to provide payments for treatment of the tuberculous, although all their available beds have always been occupied. I am convinced that the time factor has not been sufficiently long to demonstrate the advantage accruing to Saskatchewan, for it is, in my opinion, wise financial expenditure to provide machinery to curtail the losses from tuberculosis.

Why do the death rates in the four eastern provinces run so very high in the population 15 years of age and over? The death rates in the age groups 15 years and over, as shown in Table IV, are very high. In the decade under consideration, however, the rate of fall in this age group is as great as the fall in the rate for all ages.

As the tuberculosis death rate of the white population is higher in Manitoba than it is in the other prairie provinces, is the influence of the incidence of tuberculosis in the Indian and half-breed population the factor? I do not think that there is a sufficient population difference in the percentage of Indians and half-breeds (see Table VI) to account for the variation. The larger urban centre of Winnipeg and its industrial influence may require consideration as a factor. It is further suggested that Manitoba Indians have had a longer and numerically more

intimate association with the early white tuberculosis-infecting population than have those in Saskatchewan and Alberta. Like the Brant Reserve Indians in Ontario, they may be developing a greater state of "tuberculinization." Their death rate from tuberculosis may be lower than that in Saskatchewan or Alberta. Moreover, Manitoba's Northern Indians may be a larger percentage of the total provincial Indian population. They may live more as roving, non-domiciled hunting bands.

These last two influences may be the reason why Table VI shows Indians under 15 years of age forming 3 per cent of the population and contributing 44.4 per cent of the tuberculosis deaths, a much smaller ratio, when compared with Saskatchewan and Alberta, than the provincial death rates would warrant. This might be due to less intense exposure to infection by living in the open air and sleeping in constantly changing new quarters.

APPENDIX

The following paragraphs are taken from a letter from the Secretary of the Section of Vital Statistics of the Canadian Public Health Association, Mr. W. R. Tracey, who has given invaluable assistance in the preparation of this paper.

"I enclose a table showing the computed death rates which would be

EXPECTED DEATH RATES FROM TUBERCULOSIS IN THE PROVINCES OF CANADA, 1931

RATE PER 100,000 POPULATION

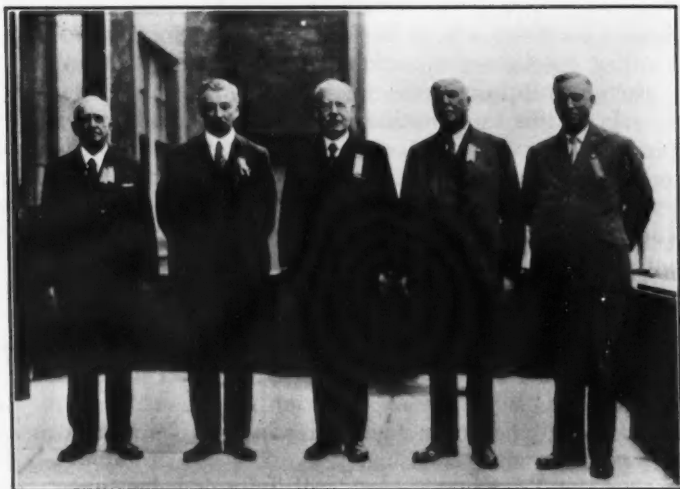
	All ages	Under 15 years of age	15 years of age and over
Canada	73	36	91
Prince Edward Island	72	36	89
Nova Scotia	72	35	90
New Brunswick	71	36	90
Quebec	72	36	92
Ontario	75	35	91
Manitoba	73	35	91
Saskatchewan	71	35	91
Alberta	73	36	91
British Columbia	76	35	90

NOTE: The expected deaths by sex and age groups in each province were computed by applying the specific death rates of Canada to the population in the corresponding groups in each province. The rates were obtained by adding (1) age groups under 15 years, (2) age groups from 15 years up, (3) all age groups, and dividing in each case by the corresponding population. In the case of Canada, of course, the expected rates are the same as the actual.

expected if the specific rates of Canada as a whole were applied to the particular age groups of each province and the resultant number of deaths added. That is to say, these expected rates, when higher than for Canada, indicate a more unfavourable age distribution of the population for tuberculosis; and, when lower than for Canada, a more favourable age composition. The remarkable feature about the table seems to be the slight extent of the variation, whether for all ages or for the population 15 years and over. In other words, this table shows that crude tuberculosis rates are highly significant, and that the division you have made into rates under 15 years of age and over 15 years is quite satisfactory without further subdivision. The highest expected rate at all ages, it will be noted, is for British Columbia, and this is presumably due to the lower number of infants and aged persons in the province. The tuberculosis death rates, therefore, do not appear to require much standardizing for differences in age composition."

FIVE MINISTERS OF HEALTH MEET

at the Association's twenty-second annual meeting in
Saint John, N.B.



From left to right.—The Honorable H. I. TAYLOR, Minister of Health, New Brunswick; the Honorable J. M. ROBB, Minister of Health, Ontario; the Honorable MURRAY C. MACLAREN, Minister of Pensions and National Health, Ottawa; the Honorable G. H. MURPHY, Minister of Health, Nova Scotia; and the Honorable W. J. P. MACGILLAN, Minister of Health, Prince Edward Island.

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DARK FIELD EXAMINATIONS FOR THE AID OF GENERAL PRACTITIONERS

THE earlier specific treatment can be commenced in syphilis, the more effective is the treatment. This has been established as a cardinal principle by the careful study of the results of treatment in many clinics. Promptness in diagnosis is essential, for it is only in the early stage of syphilis that the patient can be given a reasonably good hope of cure. Dark field examination of chancre fluids affords the one and only means for the diagnosis of syphilis in its early sero-negative stage, but this, however, is available only in laboratories with the necessary equipment where trained observers may identify the causative spirochaete, and it is generally accepted that attendance of the patient at the laboratory is essential.

In this issue, Dr. A. L. McNabb and his associates of the Division of Laboratories, Department of Health of Ontario, describe a method of forwarding specimens for dark field examination which makes available to the general practitioner even a thousand miles away the same opportunity for this examination that is afforded in the largest clinics. A simple outfit is now at the disposal of physicians in Ontario permitting the sending of chancre fluids in suitable capillary tubes to the central laboratory from any part of the province. The results recorded in the paper are of great interest. Identification of the *Treponemata* in specimens received from physicians in distant parts of the province was possible not only when the specimens were received, but after they had been stored for a period of weeks. Six specimens were sent from London, England, and examined in Toronto. Three of these were returned to London and examined by Col. L. W. Harrison, and again sent to Toronto, where re-examination was made. Three of the specimens crossed the ocean four times. Identification of the *Treponemata* was made without difficulty.

Whether the *Treponemata* are still living is being investigated by these workers. There is a question also as to whether the observed motility is a true motility or not. Such questions, however, are not the primary concern of this paper. The essential point is that

Treponema pallidum may remain recognizable for extensive periods in chancre fluid sealed with wax in capillary tubes. Dark field examination has been brought to the rural physician's door, although it will be realized that in such circumstances a negative report will have rather less significance than usual. The importance of this extension of dark-ground facilities will be appreciated by all who have been faced with the difficulty of sending the patient to the laboratory.

AN EXPRESSION OF APPRECIATION TO THE DOMINION BUREAU OF STATISTICS

APPRECIATION of good work is often postponed or even overlooked in every field of endeavour. It is pleasing, therefore, to draw attention to the resolution which was passed at the annual meeting of the Association in Saint John, congratulating the Dominion Bureau of Statistics on its splendid achievements since its creation in 1918. In the light of our Canadian Registration Area, Dominion-wide and adequately functioning, it is difficult to realize that prior to 1920 the only vital statistics in Canada were those of certain provincial governments.

As outlined by Mr. R. H. Coats, Dominion Statistician, in the Introduction to the First Annual Report of Vital Statistics, the situation was most unsatisfactory.

"One province did not maintain provincial records of births and deaths. In others legislation and methods differed widely; for instance, the international classification of deaths was not universally followed, and each province had its own scheme for the collection, compilation and presentation of results. Of the twenty-four items which the death certificate usually calls for, two provinces omitted sixteen, another fifteen, and another thirteen. Standards of administration, *i.e.*, the degree of enforcement of registration, differed between provinces, and sometimes within the same province from year to year. Thus, whilst it was possible to assemble certain totals, the latter were incomplete and otherwise inadequate to the purposes of a national system of vital statistics."

It was not until 1918, however, that the Dominion Bureau of Statistics was constituted, making possible the co-operation desired for so many years. On April 22, 1919, all necessary legislation was completed by both the Dominion and the provincial governments, with the exception of the province of Quebec. In 1925, Quebec adopted the principles of the model bill and entered the registration area.

The Annual Reports of the Dominion Bureau of Statistics, the tenth of which was published early this year, are most satisfying volumes, indicating careful thought in the selection of the material and its tabular presentation. Among the special undertakings of the Bureau has been the publication entitled "Special Report on Contributory Causes of Death, 1926", which appeared in 1929. This

tabulation involved a large amount of labour. To all interested in vital statistics the volume was invaluable. It is sincerely hoped that a second volume will be published in the near future, as publication at intervals of five years would be most helpful. There has just been issued a limited edition of a "Manual of the International List of Causes of Death", adapted for use in Canada. Its publication at this time of economic difficulty, and its preparation during the pressure of the census returns indicate not only the importance of the place occupied by vital statistics in the work of the Bureau, but the ability and energy of the members of the staff.

The work of the Bureau is a large one, and the responsibility for vital statistics has, in large measure, rested in the hands of Mr. E. S. Macphail since the inception of the Bureau. The resolution of appreciation of the Canadian Public Health Association to Mr. R. H. Coats, Dominion Statistician, and to Mr. E. S. Macphail and the other members of the Bureau for the outstanding accomplishment in the establishing of Dominion-wide vital statistics and for their leadership is most timely.

AN INTERNATIONAL HEALTH JOURNAL

IN MARCH, 1932, the first number of the Quarterly Bulletin of the Health Organisation of the League of Nations was published. The purpose of the publication is to make readily accessible, and consequently more widely known, the findings of international conferences, minutes of committees, and reports by experts on the various health problems considered by the Health Organisation.

From this statement it might be concluded that much of the material might be too technical and of little interest to local health officers in Canada. Such, however, is not the case. Six numbers have been published, and in each articles of special interest appear. It is truly international in its scope, and through the readings of the various articles the health officers receive the consensus of opinion of experts on world problems in preventive medicine. In recent issues papers have been published dealing with malnutrition, presenting the findings of the Berlin Conference held last December, and with the problem of rural typhoid fever as discussed at a conference held in Warsaw in November. Such subjects as the prevention of tuberculosis, the system of grading milk in the United States, recommendations regarding serological syphilis tests, and immunization against diphtheria are typical of those presented.

The annual subscription in Canada is two dollars a year. Subscriptions may be forwarded to the League of Nations Society, 389 Wellington Street, Ottawa. The Association welcomes the publication of this important bulletin and it is hoped that health departments throughout Canada will add it to the list of essential journals for which they subscribe.

LABORATORY SECTION

*Bacteriophage Therapy in Acute Intestinal Infection**

(Summer Diarrhoea)

MARION M. JOHNSTON, J. H. EBBS AND MILDRED J. KAAKE

*Research Laboratories, Hospital for Sick Children, and the
Department of Paediatrics, University of Toronto*

THE series of studies (1, 2, 3) in the Hospital for Sick Children, Toronto, on infectious diarrhoea were continued in the autumn of 1932, when bacteriophage therapy was investigated. This communication records the findings and results of that investigation.

According to the records of well-baby clinics and the Out-Patient Department of the hospital and the experience of physicians in their private practices, there were fewer cases in 1932 than in 1929. It is worthy of note that in a fly survey carried out by the public health nurses of the city in homes similar to those surveyed in 1929, flies were noticeably much less in evidence. As in 1929, the cases were largely concentrated in September and October. The two sexes suffered practically equally.

Of the seventy cases on which this study was based, 60 were under 10 months of age, the remainder from 10 months to 2 years. Of the 15 deaths, giving a case-fatality rate of 21 per cent, all but one were in infants under 10 months of age. The feeding history showed again that practically all were bottle-fed; only 2 were exclusively breast-fed.

General Procedure

The cases admitted to the ward were divided into test and control groups. Thirty-three infants under 2 years of age were in the test group; 37 of similar age distribution were controls. As soon as possible after admission to the hospital a faecal specimen from each case was submitted for bacteriological examination. Polyvalent bacteriophage was at once administered to those in the test group, without knowledge of the infecting

micro-organism. When the cases were considered sufficiently recovered to be restored to their normal diets, and, in the test group, the bacteriophage treatment discontinued, a second stool specimen was examined to determine whether there was any difference in the rate of disappearance of similar bacterial species in the test and control groups. Subsequent specimens were cultured if the stay in hospital permitted, or if the bacteriophage therapy had been prolonged beyond a few days in those cases receiving such treatment. The bacterial species isolated from each patient's stool specimens were tested *in vitro* with the bacteriophage used in the therapeutic tests. Approximately four to ten colony cultures of the species from each patient were tested for possible variation in susceptibility to the action of the bacteriophage.

While the children were undergoing treatment, one of us (J.H.E.) followed their clinical condition.

Bacteriophage, Types and Use

The bacteriophage employed for treatment comprised lytic principles for *B. dysenteriae* Sonne, both R and S types, for *B. dysenteriae* Hiss-Russell and Flexner, for a typhoid-like bacillus, and for some strains of the colon bacillus.

The Sonne bacteriophage was isolated in this laboratory, having appeared spontaneously in a culture. The Hiss-Russell bacteriophage was obtained from the Univer-

*Presented at the Christmas Meeting of the Laboratory Section, Canadian Public Health Association, Toronto, December 29, 1932.

sity of Louvain, and an anti-dysentery bacteriophage through the courtesy of Dr. E. W. Shultz, Stanford University. An "intestinal bacteriophage", claimed to be active for staphylococcus, streptococcus, pyocaneus and other species, was received from a commercial firm. A bacteriophage said to be active for *B. dysenteriae* Shiga was included in the hope that some strains of the Schmitz bacillus might be lysed by it if not by any of the other bacteriophages; but in our laboratory the Shiga culture, 1036, showed the characteristics of *B. dysenteriae* Flexner. To these were added a bacteriophage for a typhoid-like bacillus which was received, together with the Shiga strain referred to above, from Dr. N. W. Larkum of the Michigan State Department of Health. The typhoid-like bacillus, number 706, gave the usual biochemical and carbohydrate reactions of the typhoid bacillus, except that it was non-motile when grown in peptone water and failed to produce acid in medium containing maltose.

It was prepared in quantity by growing each culture separately in meat extract broth, pH 7.6, over night (about 12 to 18 hours), when a few drops of the bacteriophage for the species were added. The cultures remained at room temperature until lysis appeared to be complete, after which the material was pooled and sterilized by filtration through Berkefeld W candles. Sterility tests were then carried out and lytic activity established before being used.

For administration, by mouth, equal parts of this pooled bacteriophage were mixed with 15 per cent dextro-maltose solution. Only sufficient bacteriophage-sugar solution was prepared at each time to supply the cases on the ward for a period of four hours. The activity of the bacteriophage was found not to be diminished by mixing with the glucose solution and standing for four hours; indeed not after twelve hours. Each baby in the test group was given one ounce of the mixture per hour. Thus in twelve hours 6 ounces of bacteriophage were administered. The maximum volume given one child in 24 hours was about 9 ounces. Usually very little was given during the night.

Bacteriological Findings

From the 70 babies, 163 stool specimens were obtained for bacteriological examination. From 51 cases, or 73 per cent, micro-organisms of apparent pathogenic character were isolated. The group yielded 10 strains of *B. dysenteriae* Sonne, 5 of *B. dysenteriae* Hiss-Russell or Flexner, 26 of *B. dysenteriae* Schmitz, 16 of *B. asiaticus*, and 2 of *B. paratyphosus* Beta. The species enumerated occurred singly or in mixtures of two or more as previously reported (1, 2). Proteolytic bacilli, *B. paracoli* and *B. morgani* were also frequently associated with the more important species. Forty-two strains of *B. morgani*, or about 62 per cent, were isolated. It was found unassociated with any other significant species of apparent significance in only 5 cases. While the stools were not examined for the presence of blood or pus, blood was noted in the stools of 5 patients, again with no relationship to the species isolated therefrom.

The micro-organism of apparent etiological importance was not always isolated from a second or an even later specimen, secured several days after the first. In one case, *B. dysenteriae* Sonne was isolated from the fifth specimen submitted 26 days after the first. This points either to a seeming intermittency in the elimination of the infecting species or a failure to isolate examinations and the identification of many suggestive colonies isolated from the differential medium (MacConkey's). The significant species was first isolated from the first specimen of 34, from the second of 14, from the third of 2, and not until the emphasizes the value of a series of fifth in one. The series of stool culture from previous specimens, and tures also showed that the significant species isolated persisted in the intestine for some time, being recovered as long as 26 days after the first specimen was taken. In 18 of the 34 cases in which the significant species was isolated from the first specimen, it was

not obtained in subsequent examinations. In 14 cases it was obtained from 2 or more specimens.

Of 12 colony cultures of *B. dysenteriae* Sonne, 10 were lysed *in vitro* by the polyvalent bacteriophage utilized in the therapeutic trial; three of 9 cultures of *B. dysenteriae* Flexner-Hiss-Russell were lysed; and one out of 39 cultures of *B. dysenteriae* Schmitz, one out of 31 cultures of *B. asiaticus*, two out of 30 *B. morgani*, and no cultures of *B. paratyphosus* Beta were affected by the bacteriophage. When several colony cultures of the same species from one patient were tested, either all or none were lysed. No strains of *B. pyocyaneus* or proteolytic bacilli were acted upon in the test tube by the bacteriophage. However, one strain of *B. paracoli* and several of the colon strains were readily lysed.

Results

Clinically, no difference was observed between the test cases and the controls. The bacteriophage was well tolerated and neither induced vomiting nor increased the diarrhoea, but produced no apparent change in the condition of the patient. Neither the diarrhoea nor the toxicity was apparently benefitted by its administration, nor was a fatal outcome prevented in a proportionate number of cases. The duration of illness and stay in hospital of those getting bacteriophage were as long as those not getting it. In one instance in which the Sonne strain of apparent etiological significance was lysed *in vitro*, 675 cc. of bacteriophage was given, but on the 26th day after the first isolation Sonne was again obtained from the stool and death ensued. In fact, there was no evidence in the whole group that bacteriophage hastened the disappearance of the organism from the intestinal tract even when lysis *in vitro* was readily effected.

Discussion

These findings are in accord with

the data supplied by many other investigators. In the Medical Research Council's *System of Bacteriology* (4), with few exceptions the weight of evidence is against the use of bacteriophage for infections with dysentery bacilli, chiefly Flexner. Topley and Wilson (5) found consistently negative results in the use of bacteriophage in experimental epidemics of mouse typhoid. Although some success has been reported in India by the use of bacteriophage in cholera (6), and also with a bacteriophage said to contain lytic principles for dysentery bacilli as well as for cholera vibrios (7), Riding (8), working in the Sudan with a bacteriophage supplied by D'Herelle, found no dramatic results with this method of treatment. Harper (9) in Australia reports its lack of apparent effect in gastro-enteritis or epidemic diarrhoea. Mitchell (10) found that cases of infectious diarrhoea did not respond to bacteriophage therapy. While Davenport and Johnson (11) considered that a specific bacteriophage had been effective in a laboratory infection caused by *B. dysenteriae* Flexner and claimed that the patient's symptoms abated and the infecting micro-organism disappeared from the intestinal tract with rapidity, due to its efficacy, they offer no criteria with which comparisons may be made to substantiate their claims. The conditions which they obtained might have resulted without the intervention of bacteriophage. Nabarro and Signy (12) found bacteriophage neither effective nor desirable therapy in dysentery in children.

Summary

Bacteriophage therapy did not affect the clinical course of cases of severe summer diarrhoea, even when the micro-organism of apparent etiological significance was lysed *in vitro*. The causal species was not removed more rapidly from the intestine of those cases undergoing treatment than from the controls. Not all strains of the various species were lysed.

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PUBLIC HEALTH NURSING

The Visiting Housekeepers Association of Toronto

MARJORIE BELL

Director

THE Visiting Housekeepers Association came into existence in June, 1924, with two major purposes: the first, to go into homes during illness or other emergency and give, as far as possible, such services as the mother would give under normal conditions, teaching the art of household management in the homes as opportunity offered; the second, to advance by practical means, investigations, surveys and other methods, the present knowledge of nutrition, dietetics and home economics. For some years the major emphasis has been given to the first of these objectives. A total of 73 housekeepers have been trained for the field and an average of 30 maintained on duty.

The need for such a service had long been felt and was increasing with the exodus of women from the home into industry. The unmarried aunt who so often had met the emer-

gency was no longer available, with the result that mothers, not seeing any possibility of care for the family, refused to admit their own need of care till really serious conditions made it necessary. Then again, their permanent recovery was retarded or prevented by taking over their responsibilities before they were physically fit for the task. The young women whose lives had been in the business world came to homemaking with only their background of office training and frequently acquired children before they had had time to acquire experience.

The Visiting Housekeeper is an attempt to meet these modern situations. Her availability gives nurses and doctors assurance in urging early diagnosis, and her presence sends a mother to hospital relieved of anxiety for her children, or lets her regain her health undisturbed in her own home. She helps the mother into ways of

order and system and teaches her the value of balanced meals. In Toronto the housekeeper is now recognized as being the satisfactory solution of many of the problems of the nurse, social worker and doctor, and as filling a real need in the community.

Within the last year the second objective has received special attention. On budgets reduced to a minimum, the foods most essential to health are frequently left out, with far-reaching results in ill health. It was felt that every effort should be made to teach values and that methods should be developed for contacts with larger groups. Miss Redmond, the assistant director, had charge of this field, and with the assistance of a volunteer group from the graduates of the School of Household Science, whose

chairman was Miss Ruth Carruthers, a series of six demonstrations were given in 14 centres in various parts of the city. Visits were also made to homes for special instruction, single talks on nutrition given, and leaflets with menus and recipes prepared for distribution. On the whole, the results have been so satisfactory that the programme will be continued and extended for next winter.

With the increasingly artificial conditions of city life and food supply, it is necessary for mothers to understand the essentials of health if even present standards are to be maintained. The Visiting Housekeepers Association will attempt by every method available to interpret these essentials and bring them into practice in the homes.

FOOD, DRUGS AND NUTRITION

International Vitamin Standards

IN June, 1931, a conference was held in London under the auspices of the Permanent Committee on Biological Standardization of the Health Organisation of the League of Nations with the object of considering the possibility of adopting standards and defining units for certain of the vitamins. The conference recommended the adoption of a standard and defined a unit in terms of such a standard in the case of four vitamins—A, B₁, C and D. The National Institute of Medical Research, Hampstead, London, was nominated to act on behalf of the Health Organisation as a central laboratory for the storage of vitamins A, B₁, and D. In the case of vitamin C no preparation or stor-

age of a stable standard was involved by the recommendation of the conference, which was satisfied to recommend the use of fresh lemon juice as a standard for this vitamin, and to define the unit as the anti-scorbutic activity of 0.1 cm. of the juice prepared according to a simple method described in the report.

VITAMIN A

Carotene was recommended as the international standard for vitamin A, and the unit was defined as the vitamin A activity of 1 X (0.001 mg.) of the standard preparation of carotene. Eight laboratories have contributed varying quantities of carotene, and

these have been mixed at the National Institute for Medical Research; the mixed carotene has been purified by recrystallization until the melting point was above 179°C. The highly purified preparation has been distributed in 10 mg. quantities into small ampoules in an atmosphere of pure nitrogen, reduced to dryness, and the ampoules sealed.

VITAMIN D

With regard to the international standard for vitamin D, the conference recommended that the standard solution of irradiated ergosterol, which was issued from the National Institute for Medical Research, Hampstead, during the years 1930 and 1931, should be adopted as the international standard. On account of the fact that this standard preparation had been intended, primarily, for the needs of Great Britain alone, it was considered desirable to prepare a larger quantity to meet the needs of other interested countries—nineteen in all—for a period of some years. Accordingly, a second and larger quantity of irradiated ergosterol has been prepared at the National Institute for Medical Research, and this has been assayed in terms of the original standard preparation. The comparative examination of the new and the original standard preparations has been carried out by eight different laboratories in five different countries, and these eight groups of workers are unanimous in

agreeing that the new standard now available is exactly equivalent to the original standard. There is, accordingly, now available an adequate amount of this standard preparation of vitamin D to meet the requirements of all workers throughout the world for some years to come. The unit recommended for international use is defined as the vitamin D activity of 1 mg. of the international standard solution of irradiated ergosterol.

VITAMIN B₁

The standard for vitamin B₁ recommended for international adoption is a concentrated preparation of the antineuritic vitamin B₁, adsorbed on kaolin. In accordance with the terms of the conference, this standard has been prepared in the Medical Laboratory, Batavia, Java. The international unit was defined as the antineuritic activity of 10 mg. of the international standard preparation. The standard preparation is very stable, and, provided it is protected from moisture, appears to retain its activity unchanged.

Suitable supplies of each of the above standards have been sent to approved national institutions for local distribution. In the case of this country the institution which is in charge of distribution, and to which those who wish to obtain supplies of one or other of the standards should apply, is the Department of Pensions and National Health, Ottawa.

NEWS

Compensation in Bovine Tuberculosis Testing

SINCE it was found that better progress in the control of bovine tuberculosis can be made under other policies, such as the accredited herd plan and the restricted area plan, the Department of Agriculture, Ottawa, recently discontinued the testing of cattle under the Municipal Tubercu-

losis Order. This was the first order passed to provide for the compulsory slaughter of reacting cattle and the payment of compensation therefor. The Department is still paying compensation for reacting cattle under the accredited herd and restricted area plans, but owing to the necessity for retrenchment it is not accepting any more new herds under these compen-

sation policies during the present fiscal period. Owners can, however, have new herds tested under the supervised herd plan without receiving compensation.

Encephalitis Epidemica in St. Louis

A SERIOUS outbreak of encephalitis epidemica has occurred in St. Louis, Mo. To date (September 5th), 482 cases have been treated, with 72 deaths since the first death was reported on July 30th. The direction of the investigation of the outbreak is in the hands of the United States Public Health Service. According to a report, the causative agent has been identified as a filterable virus by Dr. M. G. Smith, of Washington University Medical School, St. Louis. This outbreak constitutes one of the largest in America since the recognition of the disease in 1918.

The New Canadian Formulary

MANY expressions of appreciation of the publication of the new Canadian Formulary have been received by the Canadian Medical and Canadian Pharmaceutical Associations. The old Canadian Formulary was almost exclusively a pharmaceutical one and the book was never greatly used by physicians. At the time of revision, the opportunity was taken to add a Canadian Addendum to the Pharmacopoeia. Reviews of the many important changes, including details of volume, have already been published in medical journals. The Formulary has the approval of all interested bodies and should be of very great value to every practising physician.

British Columbia

IN a recent publication the Provincial Board of Health has drawn attention to the importance of vaccination against smallpox. In addition to the virulent outbreak in Vancouver last year, two cases of haemorrhagic smallpox occurred in Victoria. A total of nine cases on three different ships were found by quarantine officers at

Williams Head, indicating the continued danger of the importation of virulent smallpox from the Orient.

Saskatchewan

CANCER was the keynote of the convention of the Saskatchewan Medical Association, which was held in Regina recently. Dr. Joseph Colt Bloodgood, of the Johns Hopkins Hospital, Baltimore, was present as guest speaker on the invitation of the Provincial Government, and urged the medical and dental professions of the province to accept gladly their responsibilities in the prevention or the very early treatment of the disease.

Ontario

POLIOMYELITIS has been slightly less prevalent during the present year to date (August 19th) than it was during 1932. Twenty-one cases have been reported, as compared with thirty-two cases for the same period in 1932. Supplies of convalescent serum are held at the distributing centres of the Department of Health for administration to cases discovered in the pre-paralytic stage of the disease.

Miss Eunice Dyke, formerly in charge of the Department of Public Health Nursing of the city of Toronto, will visit Great Britain and Europe this fall in a study tour, having been given a travelling fellowship by the International Health Division of the Rockefeller Foundation.

The Ontario Hospital Association will hold its meeting this year in the Royal York Hotel, Toronto, on October 25th, 26th and 27th. The opening address will be delivered by the Honorable Dr. J. M. Robb, Minister of Health, and a number of subjects of public health interest will be presented.

Quebec

AS a result of the considerable decrease in the morbidity and mortality rates from diphtheria in 1932,

the Provincial Bureau of Health has decided to intensify the campaign of immunization in the existing county health units and to extend this work to counties not yet so organized.

Three physicians who completed the course leading to the Diploma of Public Health at the School of Hygiene, University of Toronto, last spring, are now associated with the Provincial Bureau of Health. Dr. F. J. Tourangeau is working in co-operation with the health officers of the units of Laviolette and Champlain, Dr. J. A. Lapiere has been appointed health officer of the county health unit of Beauce, and Dr. E. Martel is doing field work with the Gaspé-East unit.

New Brunswick

DURING the absence of Dr. R. J. Collins, who has been granted leave of absence to engage in post graduate study in Great Britain for six months, Dr. A. Clark will be acting superintendent of the Saint John Tuberculosis Hospital.

Dr. C. W. MacMillan, medical officer of health for Saint John and Charlotte counties, has resumed his office after completing the course leading to the Diploma in Public Health at the School of Hygiene, University of Toronto. Dr. J. M. Cameron, who

relieved Dr. MacMillan, has returned to his work as travelling tuberculosis diagnostician.

Nova Scotia

OF the six members of the graduating class in nursing of the Nova Scotia Hospital (mental), four were men. The presentation of diplomas was made on June 5th by Chief Justice Chisholm. Addresses were given by Dr. W. D. Forrest and the Hon. Dr. Murphy. Mr. J. S. Misener was chairman of the gathering.

In the recent provincial elections, the Honorable Dr. G. H. Murphy, Minister of Health, was defeated with the Conservative party in Halifax. During his term of office, public health in Nova Scotia has made many advances, notably in the development of a cancer control programme, in extending the tuberculosis facilities and in the field of mental hygiene.

Prince Edward Island

THE new Prince Edward Hospital, Charlottetown, was formally opened on July 4th, with the Honorable W. J. P. MacMillan representing the provincial government. The building is most complete and presents the very latest developments in hospital construction.

REPORTED CASES OF CERTAIN COMMUNICABLE DISEASES IN CANADA* BY PROVINCES—JULY, 1933

Diseases	P.E.I.	Nova Scotia	New Brunswick	Quebec	Ontario	Mani- toba	Saskat- chewan	Alberta	British Columbia
Diphtheria.....	—	4	10	51	32	29	5	1	4
Scarlet Fever...	—	14	6	88	134	43	10	10	32
Measles.....	—	—	1	411	103	6	3	—	1
Whooping Cough.....	—	1	7	310	429	250	49	32	62
German Measles	—	—	—	6	4	—	—	—	17
Mumps.....	—	—	—	51	133	10	19	2	31
Smallpox.....	—	—	—	—	—	—	—	—	—
Cerebrospinal Meningitis...	—	—	1	1	7	1	—	—	—
Anterior Poliomyelitis..	—	1	—	8	1	1	1	2	1
Typhoid Fever..	—	—	10	73	29	10	6	6	4
Trachoma.....	—	—	—	—	—	—	1	—	5

*Data furnished by the Dominion Bureau of Statistics, Ottawa.

BOOKS AND REPORTS

Nutrition Service in the Field; Child Health Centres: A Survey. *A publication of the White House Conference on Child Health and Protection. Published by the Century Co., 353 Fourth Avenue, New York, and London, 1932. 196 pages. Price, \$2.00.*

This volume contains the reports of two subcommittees of the Committee on Medical Care for Children of the White House Conference on Child Health and Protection. The two subcommittees are those on Nutrition and on Child Health Centres. In the book 139 pages are devoted to the first report and 57 to the second.

The report on nutrition emphasizes the principal recommendation that every programme for child health should contain nutritional work as a basic feature. For this there should be employed properly trained "nutritionists" under medical direction. This recommendation and others will meet with general approval. The present reviewer cannot feel so enthusiastic about the suggestion that "a determined effort be made to create a nutrition consciousness". Surely if there is a danger in this field these days it is that the public may become satiated with nutritional publicity, especially since so much of it has an axe to grind. The most commendable feature of this report is that it contains a number of examples of nutritional programmes of varied types. Unfortunately these accounts have been written by those responsible for the activities and are possibly unduly optimistic. Nevertheless, they contain many useful ideas of practical application at the present time.

The second report occupies a smaller portion of the volume and is largely statistical. In the minds of members of the committee, child health centres are intended only for well children, and should function as teachers of preventive medicine. Sick children should be treated by the family physician or by hospitals.

The volume is capably edited and

well printed. It may be recommended to all those in public health work, and should prove of considerable value in these days when there is widespread fear of undernutrition and resultant ill-health.

E. W. McH.

Principles of Health Education.

By Clair Elsmere Turner, M.A., Dr.P.H., Professor of Biology and Public Health, Massachusetts Institute of Technology. Published by D. C. Heath and Company, Boston, 1932. 317 pages. Price \$2.00.

Professor Turner is one of the leaders in the field of public health education on this continent. This volume has been prepared for the various groups—administrators, school nurses, school physicians, secondary school teachers of general science, etc.—engaged in health education in public schools. From years of practical experience and investigations in classrooms the principles and procedures which have been found practical and useful are presented.

The principles of health education, as stated by Professor Turner, are based on practical experience and the volume therefore will serve as a valuable guide for those who are attempting health education in schools. *Gradation of Material, Methods of Class Instruction, Source Material, Health Education in Junior and Senior High Schools*—these are a few of the chapter headings, indicating the practical manner in which the whole subject is dealt with. Those interested in health education are familiar with the Malden research studies; a review of the reasons for this research, its objectives and a summary of its results, is given, emphasizing the practicability and educational value of health education. The development of right attitudes and habits, as well as sound knowledge in the field of health, is the objective of health education. Professor Turner's book well serves as the basis for a sound programme.

R. D. D.

American and Canadian Hospitals.

Edited by James Clark Fifield with the co-operation of the American Hospital Association. Published by the Midwest Publishers Company, Minneapolis, 1933. 1560 pages. Price, \$10.00.

The need for the publication of an historical and informative work of reference on accredited hospitals and allied institutions throughout the United States and Canada has long been recognized. The American Hospital Association, with the hearty co-operation of the executives of hospitals everywhere on the continent has met this need by the publication of this impressive volume, containing comprehensive sketches of all hospitals and allied institutions in the two countries and in Newfoundland and the Yukon Territory.

In the Canadian section the provinces are presented in alphabetical order and in each province the municipalities having hospitals are likewise arranged alphabetically. The value of the volume lies not only in its completeness as a directory but also in the excellent descriptions of the hospitals, including physical, equipment, staff and history, information as to rates, property value and other statistical data. Generous space is given to even the smallest hospitals. A section of the volume which will be appreciated is the Appendix, in which are presented complete yet concise outlines of the important national associations of medical and public health interest. Here may be found, for instance, a statement of the work of the Canadian Red Cross Society, of the Milbank Memorial Fund, the National Tuberculosis Association, the Commonwealth Fund, and other important philanthropic agencies.

The volume is particularly well edited and the type is read with ease. Not only will hospital executives appreciate the fiscal data and other details permitting of comparison, but the larger health departments will also find it a reference work of practical value.

R. D. D.

Vital Statistics in British Columbia.

By J. T. Marshall, Inspector of Vital Statistics, British Columbia. Issued by the Provincial Board of Health, 1933. 222 pages. Price, \$1.00.

This very comprehensive report was published to commemorate the conclusion of the 60th year of registration of births in British Columbia.

It contains an excellent survey of the general history of the Vital Statistics Branch of the Provincial Board of Health; the changes from time to time in legislation covering both "Vital Statistics" and the "Solemnization of Marriage"; the history of the registration districts and the extension of registration facilities to the people of British Columbia; a review of the forms prescribed and used pursuant to the provisions of both Acts; population and census; and finally the general statistics of the branch.

The well arranged table of contents and detailed general index enable one to find very easily information on any particular portion of the subject.

M. A. R.

What to Tell the Public about Health.

Written for and published by the American Public Health Association, 450 Seventh Avenue, New York, 1933. 255 pages. Price, \$1.00.

Public health instruction is the foundation of effective public health work. Such instruction calls for well prepared material concerning all features of public and personal health. Efforts at health education are, however, usually limited to provincial or state departments, or to the health departments of large cities. The average medical officer of health makes little use of newspapers, and even discourages any attempt of the press to obtain news. There are several reasons for this attitude. The most important one is the realization on the part of the health officer that the presentation of health facts in a way that will be interesting to the general public requires a special aptitude for writing,

as well as sufficient time and special training.

Professor Ira V. Hiscock has brought together for the American Public Health Association one hundred or more popular short newspaper articles, posters and announcements. The names of many of the authors of the articles are those of well known public health leaders. These articles are intended to serve in several ways,—as suggestions only or for local publication with or without change. The book is not copyrighted and the material contained therein is at the disposal of all health workers.

The response accorded the first edition was so generous that a second edition has just been made available.

R. D. D.

Health Protection for the Preschool Child. *A publication of the White House Conference of Child Health and Protection. Published by the Century Co., 353 Fourth Avenue, New York, 1932. 275 pages. Price, \$2.50.*

This volume embodies the data derived from a national survey of the use of preventive medical and dental service among children under six years of age. In part at least it gives an answer to the questions, What is the status of child health in the United States? What is being done? What ought to be done?

The book is divided into four sections. The first of these deals with the general status of preventive measures for children under six years of age. The second sets out the results

of this extensive national survey, one which included in its scope 146,000 children in 156 cities and 37,000 children in rural areas of 42 states. The material is presented to indicate the extent of the use of two general and two specific preventive measures among preschool children; namely, medical health examination, dental health examination, vaccination against smallpox, and immunization against diphtheria. Analyses are presented to show the variations which obtain in each of the four measures from state to state, according to whether rural or urban, with variations by age and economic status. Many definite lessons can be learned by the health officer, e.g., 21 per cent of preschool children in cities have been vaccinated against smallpox, but only 7 per cent of rural children have been thus protected! In the third part are assembled the statistical tables used in the report. The volume concludes with part IV, an outline of the administrative features of the survey and methods used in statistical treatment.

To obtain such data on the actual extent of the use of preventive medical service among preschool children throughout the country is essential, both nationally and locally, to the making of practical recommendations for the better care of child health, as well as in indicating the public response to existing health measures. This volume will occupy a definite place in the literature on the health of the preschool child and will be of practical value as a guide in future public health activity in this field.

A. H. S.

BOOKS RECEIVED

Public Health Nursing in Industry. Prepared for the National Organization for Public Health Nursing by Violet H. Hodgson, Reg.N. Published by the Macmillans in Canada at St. Martin's House, Toronto, 1933. 249 pages. Price \$2.10.

The History and Epidemiology of Syphilis. By William Allen Pusey, M.A., M.D., LL.D. Published by Charles C. Thomas, Springfield, Illinois, 1933. X + 110 pages. Price \$2.00.

Highways to Health. By Donald Y. Solandt, M.A., M.D. Published by the Ryerson Press, Toronto, 1933. 159 pages. Price \$1.00.

Practical Food Inspection. Vol. I—*Meat Inspection*; Vol. II—*Fish, Poultry and Other Foods.* By Charles R. A. Martin, M.R.S.I., A.M.I.S.E. Published by H. K. Lewis and Company, Limited, London, England, 1933. VIII + 250 pages. Price 10s. 6d.

CURRENT HEALTH LITERATURE

These brief abstracts are intended to direct attention to some articles in various journals which have been published during the preceding month. The Secretary of the Editorial Board is pleased to mail any of the journals referred to so that the abstracted article may be read in its entirety. No charge is made for this service. Prompt return (after three days) is requested in order that the journals may be available to other readers.

A Virus Obtained from Influenza Patients

This paper marks an important advance in the study of influenza and provides those who may have to study the next influenza epidemic with knowledge of a susceptible experimental animal.

The authors have demonstrated that the ferret may be infected by bacteriologically sterile filtrates of throat washings from influenza patients. After an incubation period of two days the infected ferret becomes ill, shows an abrupt rise in temperature, looks ill, refuses food, is quiet and lethargic and may show signs of muscular weakness. Catarrhal symptoms begin on the third day, while the temperature subsides, only to rise again on the fourth or fifth day. The illness lasts from a few days to ten days, after which the animal becomes normal.

The disease may be transmitted serially in ferrets by placing a normal animal in a cage for twenty-four hours with an infected animal, or by intranasal instillation of nasal washings from a sick ferret. Initially the disease was produced by five out of eight throat washings obtained from influenza patients in the early stages of the disease. Throat washings from healthy persons and influenza convalescents caused no illness in ferrets.

Ferrets recovered from the disease were found to be immune to infection with the same strain of virus, and the sera of recovered ferrets, when mixed with infective filtrate before intranasal inoculation, were found to neutralize the virus. Normal ferret serum did not exhibit neutralizing properties. Human sera from ten patients recovered from influenza neutralized the virus, while one out of three sera from individuals with no history of a recent attack also neutralized.

Swine influenza virus produces an illness in ferrets indistinguishable from that produced by virus of human origin. Ferrets recovered from infection with the swine virus were found to be immune to the human virus, but other ferrets convalescent from the human virus disease were not completely immune to the swine strain.

The haemoglobinophilic bacilli, *H. influenzae* (*suis*), which plays an important rôle in grave and fatal cases of swine influenza, and *H. influenzae*, often intimately associated with influenza in man, seem to have little influence in the ferret disease, for addition of cultures of these organisms to the virus produced only minor variations in symptoms. This finding, along with the demonstration that human convalescent serum neutralizes the virus, would indicate

that human influenza is caused primarily by a filterable virus infection.

Wilson Smith, C. H. Andrewes and P. P. Laidlaw, *The Lancet*, p. 66, July 8, 1933.

Seasonal Distribution of Whooping Cough for Periods of High and Low Incidence

This analysis is based on the reported monthly incidence of whooping cough in various states of the United States for the years 1922 to 1931. During periods of low incidence the seasonal distribution curve exhibits less amplitude than during periods of high incidence. The time relationship of the peaks of the high and the low incidence curves is not constant, and on classification of the curves of various states on this basis, the states do not fall into consistent geographical groups based on climatic conditions.

G. E. Harmon, *Am. J. Pub. Health*, 23: 789 (August), 1933.

Pulmonary Asbestosis

The clinical, radiological and pathological findings of asbestosis are presented. This occupational disease must be grouped with silicosis as a very serious pneumoconiosis. The average length of employment in fatal cases is only one half that of silicosis.

Diagnosis depends on (a) opportunities for the inhalation of asbestos dust, (b) the finding of asbestos bodies in the sputum, and (c) clinical and radiological evidence of fine, diffuse, pulmonary fibrosis commencing at the bases. The onset of symptoms usually occurs after some five to ten years of exposure to the dust. Dyspnoea and emaciation, a dusky or cyanotic complexion, scanty expectoration and absence of haemoptysis are characteristic features. Once established, the disease is progressive and the prognosis bad. Tuberculosis is by no means an uncommon complication.

Philip Ellman, *J. Indust. Hyg.*, 15: 165 (July), 1933.

Epidemiology of Syphilis and Gonorrhea

The author contends that the epidemiology of syphilis and gonorrhea is possible and can be done. He points out that, while venereal diseases are communicable diseases, they escape the epidemiological investigation which attends cases of smallpox and typhoid, and that there is too little prevention.

Accounts of 19 investigations, selected from a number recently carried out, are given, illustrating some particular phase or type of investigation either from approach or methods.

William L. Munson, *Am. J. Pub. Health*, 23: 797 (August), 1933.

